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Health
Building Note 40
Volume 2

Health Building Note 40

Volume 2: Treatment areas

Common activity spaces

NHS Estates
An Executive Agency of the Department of Health

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Volume 2: Treatment areas

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About this publication

The Health Building Note series is intended to give advice on the briefing and design implications of Departmental policy.

These Notes are prepared in consultation with representatives of the National Health Service and appropriate professional bodies.

Health Building Notes are aimed at multidisciplinary teams engaged in:

- designing new buildings;
- adapting or extending existing buildings.

Throughout the series, particular attention is paid to the relationship between the design of a given department and its subsequent management. Since this equation will have important implications for capital and running costs, alternative solutions are sometimes proposed.

The intention is to give the reader informed guidance on which to base design decisions.

Health Building Note 40

The volumes identified by the general title 'Common activity spaces' bring together guidance on spaces that frequently occur in common form in health buildings. Other Health Building Notes, dealing with specific departments, refer to the Common activity spaces HBN for guidance on these commonly occurring spaces.

Acknowledgements

The Royal National Institute for the Blind

Access Committee for England
(Extract from HBN 40, Volume 4, 1988/9)

Contents

About this publication

1. Scope of Health Building Note 40, Volume 2 *page 3*
1.1 Introduction
1.10 Capital Investment Manual
1.11 Cost Allowance
1.12 Equipment
1.13 Works Guidance Index

2. Design and functional considerations *page 5*
2.1 Introduction
2.2 Disabled people
2.8 Statutory and other requirements
2.10 Privacy
2.11 Fire precautions
2.13 Upgrading, extending or adapting existing buildings
2.18 Building components
2.19 Maintenance and cleaning
2.20 Damage in health buildings
2.21 Signposting
2.22 External environment – parking areas and courtyards
2.26 Circulation spaces
2.28 Doors
2.29 Windows
2.30 Natural and artificial lighting
2.31 Internal spaces
2.32 Ventilation
2.33 Flooring
2.34 Fittings
2.35 Information technology
2.37 Security
2.38 Portering
2.39 Smoking

3. Critical dimensions *page 11*
3.1 Introduction
3.2 Component dimensions
3.3 Activity dimensions
3.5 Examples

4. Engineering services *page 13*

5. Cost information *page 14*
5.1 Introduction
5.3 Works cost
5.5 Functional units
5.9 Dimensions and areas
5.12 Circulation areas
5.13 Communication routes
5.14 Engineering services

6. Example layouts *page 16*

6.1 Consulting/examination/treatment areas *page 16*
Consulting/examination room – General Type 1
Consulting/examination room – General Type 2
Consulting/Interview room
Examination room
Treatment room

6.2 Bed/cot care *page 25*
Bed, various
Bed, divan
Single bed room 1
Single bed room 2
Single bed room 3
Single bed room 4
Twin bed room 1
Bed space
4 Bed space
6 Bed space

6.3 Patient hoists *page 36*
Patient hoist 1, mobile chair (wide or narrow base) turning 90°
Patient hoist 2, mobile chair turning 90° & 180°
Patient hoist 3, mobile chair (wide or narrow base) to and from bathroom
Patient hoist 4, with chair attachment, drying and dressing patient
Patient hoist 5, mobile chair hoist, manoeuvring into and out of bath

6.4 Toilets *page 42*
Toilet 2, Ambulant, semi- and assisted ambulant – frontal access
Toilet 3, Ambulant, semi- and assisted ambulant – side access
Toilet 4, Independent wheelchair users, with basin
Toilet 5, Independent and assisted wheelchair users, with basin
Toilet 6, Dual assisted wheelchair users, with basin
Toilet 7, WC with bidet and basin

6.5 Bathrooms *page 50*
Bathroom 1, Ambulant, assisted ambulant and independent wheelchair patients, with WC and personal washing facilities
Bathroom 2, Assisted patients, use of hoist, with WC and personal washing facilities

6.6 Showers *page 54*
Shower 1, Partially capable users with assistance and wheelchairs, with WC and wash basin, linear layout
Shower 2, Partially capable users with assistance and wheelchairs, with WC and wash basin, non-linear layout
Shower 3, Shower/WC and bidet

6.7 Components *page 58*
Desk 1, Doctor's with drawers on one side
Chair 3, Upright
Person 8; Dressing/undressing
Low partition 1, Office/bed privacy screen
Switches and sockets 1, wall mounted
Door screens 1, Single door, 1000, 900 door sets
Door screens 2, 1500 door sets
Bidet, Ambulant or semi-ambulant patients
Bath 1, Wheelchair access
Basin 1, Handrinse
Basin 2, Medium; personal washing
Basin 3, Handrinse (wheelchair users)
Basin 4, Medium (wheelchair users)
Basin 5, Medium; clinical handwashing (staff users)
Taps 1, Basin
Taps 2, Basin
Taps 3, Basin
Wardrobe 1, Clothes storage
Shelving 3, Open 200 deep
Worktop bench 3
Cupboards 3, Wall mounted
Drawers 1
Sink 1
Sink 2, Laundry
Sink 3, Laundry
Sink 4, Stainless steel, single with draining board
Ironing board 1, Partially capable, standing or seated users
Ironing board 2, Assisted and independent wheelchair users
Oven 1, Small
Cooking hob 1, Small
Refrigerator 1
Washing machine 1, Front loading
Planting beds 1, Partially capable users
Planting beds 2, Wheelchair users
Planting beds 3, Wheelchair users

Appendix 1 Healthcare premises: checklist of access and facilities for disabled people *page 97*

Appendix 2 References *page 99*

Appendix 3 Further reading *page 102*

Appendix 4 Activity Data *page 103*

Appendix 5 Index of Ergonomic Data Sheets in other volumes of HBN 40 *page 104*

Other publications in this series *page 107*

About NHS Estates *page 108*

1.0 Scope of Health Building Note 40, Volume 2

Introduction

1.1 This document is the second volume of Health Building Note 40, 'Common activity spaces' which provides guidance on activity spaces frequently occurring in common form in health buildings. The previous issues of HBN 40 were Volumes 1 and 2 in February 1985, and Volumes 3 and 4 in 1988. All four volumes of HBN 40 have now been restructured and updated to reflect the latest thinking on common activity spaces in health buildings and to provide guidance on access provisions for disabled people to these buildings.

1.2 Volume 1 (Public areas) – provides detailed ergonomic data on a variety of public spaces, and is related to information in Activity Data Sheets specifically prepared to complement that volume. It aims to provide the essential information with which the designer may produce the most effective and efficient solution for a particular project.

1.3 This volume – Volume 2 (Treatment areas) – provides detailed ergonomic data on a variety of clinical and sanitary spaces and associated components, and is related to information in Activity Data Sheets specifically prepared to complement this volume.

1.4 Volume 3 (Staff areas) provides detailed ergonomic data on a variety of administrative and support spaces and associated components, and is related to information in Activity Data Sheets specifically prepared to complement that volume.

1.5 Volume 4 (Circulation areas) deals with internal horizontal and vertical hospital circulation and communication spaces (that is, corridors, lifts and stairs). It provides guidance on the planning and design of traffic routes both within and between hospital departments. Particular emphasis is given to the space requirements for the movement of people, goods and equipment.

1.6 This guidance relates space provision to the functions of an activity space, having regard at all times to the need for economy. Where design teams use this information to determine space layouts and sizes, the need for economy should always be a prime consideration so that maximum advantage can be obtained from the departmental cost allowance. Activities should be carefully considered so that space can be shared for similar activities or for activities which take place at different times.

1.7 Where a common activity space occurs in the building note for a department, there will be no detailed description of that space, but instead there will be a cross-reference to that building note. Where there are special departmental requirements which warrant a variation from the common form of the activity space, appropriate information is provided in the relevant building note.

1.8 In the text of this volume, documents are mainly referred to by their title only. Full details of these documents are included in the 'References', which constitute Appendix 2 of this volume.

1.9 Details of other relevant publications, research and associated material which may be of interest for further reading are contained in Appendix 3 of this volume.

Capital Investment Manual

1.10 The Capital Investment Manual (England and Wales; in Scotland see 'Health Building Procurement in Scotland') contains the NHS Executive's procedural framework governing the inception, planning, processing and control of individual health building schemes. Although there are various mandatory requirements within the overall process, the individual NHS trusts are, in the main, granted a certain degree of flexibility in the manner in which these tasks are to be carried out; however, approval from the NHS Executive for business cases will depend on how the trusts intend to carry out the mandatory tasks. The Manual gives guidance on the technical considerations of the full capital appraisal process, while also providing a framework for establishing management arrangements to ensure that the benefits of every investment are identified, realised and evaluated. It emphasises three key points:

- each individual scheme must be supported by a sound business case. A business case must convincingly demonstrate (by means of an option appraisal) that the investment is economically sound and financially viable (that is, affordable to the trust and its purchasers);
- an exploration of private finance alternatives should be viewed as a standard option whenever a capital investment scheme is being considered. Once the Outline Business Case has been approved, the preferred option should be compared to potential private finance alternatives. Approval to the Full Business Case will not be given unless there is a clear demonstration that private finance alternatives have been adequately explored;
- the delivery of a major capital project is a difficult and complex task. Nevertheless, any failure to deliver on time and to cost will divert resources from direct patient care. The establishment of an appropriate project control/monitoring system and organisation is

essential, in order to ensure that projects are delivered within the agreed budgets and timescales.

Cost Allowance

1.11 The DCAGs (Departmental Cost Allowances Guides) associated with Volumes 1 to 3 of this Health Building Note are promulgated in 'Quarterly Briefing' (issued separately under cover of an Estate Policy Letter) on behalf of NHS Estates.

Equipment

1.12 The equipment used in the areas covered by this Volume (that is, the treatment areas of a health building) can be categorised into four groups, as follows:

Group 1: items (including engineering terminal outlets) which are supplied and fixed within the terms of the building contract;

Group 2: items which have specific requirements with regard to space and/or building construction and/or engineering services and are fixed within the terms of the building contract but supplied under arrangements separate from the building contract;

Group 3: as Group 2, but supplied and fixed (or placed in position) under arrangements separate from the building contract;

Group 4: items which are supplied under arrangements separate from the building contract, possibly with storage implications but otherwise having no effect on the requirements for space or engineering services.

Works Guidance Index

1.13 The guidance contained in this volume is current at the time of publication. (Specific issues, such as arrangements for dealing with fire, security, energy conservation, etc., are covered by other published documents, which must also be taken into account.) Some aspects of this guidance may from time to time be amended or qualified. Project teams should check the current edition of the Works Guidance Index. Because the Index is published annually, project teams should ensure that they are using the current edition; and should contact NHS Estates Library should the need arise to check any items.

2.0 Design and functional considerations

Introduction

2.1 The guidance in this document is intended to enable health buildings to be designed which are accessible, safe and usable by all potential categories of user; these will include children, an increasing number of elderly people, also patients and visitors who have mobility, sensory and dexterity impairments, and staff. (It must be stressed that health care buildings are places of work for people with disabilities.) These physical limitations impose special demands on the internal and external design of health buildings. Specific considerations include the following.

Disabled people

2.2 Identifying and understanding the conditions which constitute barriers to those with a disability (this category includes, besides the wheelchair-bound, those who for any reason have difficulty in walking, and also those with a sensory – that is, visual or hearing – impairment) is a fundamental requirement for the effective provision of accommodation and facilities to be used by disabled people. It is advisable to consult with all groups of potential users of the building (including people with disabilities and staff from all departments) at the early planning stage.

2.3 If the needs of people who have temporary or permanent disabilities are taken into consideration, the resulting design can make the building easier and safer to use for those with children, those using wheeled equipment and those carrying other items. The principle of applying critical criteria should be used – for example, where space is a consideration, wheelchairs or other larger wheeled items need to be considered; for vertical fixtures or fittings, the shorter person and wheelchair user must be considered; and for wayfinding those with visual and hearing impairments must be considered. The resulting design will help not only people who are ill or disabled but also those who are suffering from shock or stress, as many users of health buildings are. Building design which gives consideration to all users will also be easier and safer during an emergency evacuation.

2.4 The best design philosophy is to consider the journey through the health building from start to finish, analysing all the related components of the task (negotiating entrances, corridors, lifts, reception areas, toilets, etc) to ensure that the features, equipment and fittings encountered in completing the journey are suitably designed so that the overall task can be completed easily and conveniently, bearing in mind the different requirements of staff, patients and visitors with varying degrees of functional mobility. In this way building users will be more independent (less reliant upon staff) and consequently less stressed, anxious and frustrated.

2.5 People with disabilities can be defined as those who, as a consequence of an impairment, may be restricted or inconvenienced in their access to, and use of, buildings because of the physical barriers – such as doors which are too narrow, flights of steps, or unsuitable facilities (for example inadequate lighting, or lack of handrails on staircases or grabrails in toilets). Some people will be temporarily disabled as a result of their need for hospital treatment.

2.6 The following categories of building user are generally recognised:

a. **fully-ambulant:** persons who are fully physically capable of carrying out all activities necessary to their role or function;

b. **semi-ambulant:** persons who walk with difficulty or are otherwise insecure, as a result of a temporary or permanent impairment of the lower limbs. They may walk with or without a walking aid (sticks, crutches, walking-frames, etc) and/or require the assistance of another ambulant person. Some people in this category will, in addition, have reduced strength and dexterity in the upper body and/or a sensory impairment. Semi-ambulant people find it difficult to cover long distances (even 50 m may be too far). Specific design requirements include: short distances; provision of handrails and suitable places for taking a rest; also even and non slippery surfaces without any major changes in level;

c. **non-ambulant:** persons who temporarily or permanently require to use a wheelchair for mobility. They may propel themselves, or be pushed and manoeuvred by an assistant who may or may not be needed to assist with other tasks. Some people will be using a wheelchair for the first time due to being in hospital and will be unfamiliar with manoeuvring it. Some people who use wheelchairs will, in addition, have reduced strength and dexterity in the upper body and/or may also have a sensory impairment. Some will be able to stand on their feet whilst transferring to and from a wheelchair or to and from other facilities (such as a toilet, chair or bed); others will require assistance to do so (in some cases the use of a hoist). Specific design requirements include the provision of sufficient space for passing and turning; even surfaces without changes in level; and ensuring that any counters, signs, handles, etc are within the user's range of vision and grasp;

d. **manually-impaired:** persons who have a temporary or permanent lack of strength and/or dexterity in the shoulders, arms and/or hands. They may also be semi-ambulant and/or have a sensory impairment. Specific design requirements include doors which are not too heavy; suitably-designed handrails and controls, etc;

e. **visually-impaired:** persons who are totally blind or partially-sighted. Blind people find their way by noticing changes in the textures of floor and wall surfaces and ambient sounds and smells; some also need the help of a cane for orientation and for detecting obstacles. Partially-sighted people need plenty of light, and the colours of any fixtures and fittings they are trying to locate (or are on their guard against) must stand out plainly in contrast to the background. It must be remembered that vision deteriorates considerably with age; 40-year-olds need twice as much light and 60-year-olds three times as much light to see the same object as clearly as a 20-year-old. The more strongly an object contrasts with its surroundings, the easier it is to see. However, colours do not have to be garish; subtle changes in colour can be aesthetically pleasing, and can fit in with the general decor as well as providing contrast. Different colours in the same tone can appear very similar to people who are colour-blind – for example, a strong red and green together can look much the same – and so contrasting tones, or a combination of tone and colour, are very helpful for people with poor sight. Any type of cluttered design should be avoided, since this makes it more difficult for a visually-impaired person to "read" the shape of a space, and consequently impedes their ability to navigate. Good design therefore should not only contribute towards the "legibility" of a building, but also facilitate easy navigation through it. Specific design requirements include: a simple, well-planned layout; even surfaces with tactile indications of direction; no obstructions in walking areas; well-lit areas; signs placed at a convenient height, with space to stand in front to read them;

f. **hearing-impaired:** persons who are deaf and hard-of-hearing have the additional problem that their disability cannot be seen and is therefore not noticed by other people. For effective lip-reading, building areas must be well lit in order that the face of the person speaking is illuminated. Specific design requirements include: a simple, well-planned layout, with well-lit areas; surfaces which dampen ambient noise; signs placed at a convenient height, with space to stand in front; provision of induction loops at reception areas and in auditoria.

2.7 A check-list giving a suggested sequence of activities to be followed in the planning and design of access and facilities for disabled people, was prepared by the Access Committee for England for the 1988/89 edition of HBN 40, Volume 4; this is reprinted as Appendix 1 to this volume of the current edition, and is commended to health authorities.

Statutory and other requirements

2.8 The guidance contained in this volume takes account, as far as possible, of all statutory and other requirements in force at the time of publication, but health authorities and trusts are reminded of their responsibility for ensuring compliance with all relevant statutes and regulations, such as the provisions of the Chronically Sick and Disabled Persons Act 1970 (as amended by the Chronically Sick and Disabled Persons (Amendment) Act 1976), the Disabled Persons Act 1981, the Disabled Persons (Services, Consultation and Representation) Act 1986, and, in England and Wales, the Building Regulations 1991 together with the associated practical guidance in Approved Document M (in Scotland, the Building Standards (Scotland) Regulations 1990 together with Part T of the Technical Standards (Scotland)). Attention is also drawn to BS5810, Access for the Disabled to Buildings 1979 (currently under review). One of the effects of the 1981 Disabled Persons Act is to apply this British Standard to premises covered by the 1970 Act, which includes those open to the public. Practical guidance for complying with the Building (Disabled People) Regulations is issued by the Department of the Environment under Approved Document M: Access and Facilities for Disabled People, 1992.

2.9 Chapter 6 of this volume contains data relating to the ergonomic requirements for the movement of hospital patients and equipment. These ergonomic data sheets are principally concerned with the amount of "space" needed by disabled people when using health buildings or receiving treatment. They cover access to and egress from (and also movement within) health buildings. However, where the Statutes, Approved Documents, British Standards, HTMs, etc. stipulate additional requirements – such as larger dimensions – these should be complied with.

Privacy

2.10 The design of the accommodation must preserve the dignity and privacy of patients, particularly where men and women are treated in adjacent areas and share certain accommodation and circulation spaces. These must be reconciled with the need for unobtrusive clinical observation, which is vital for the care of the patient.

Fire precautions

2.11 The principles of fire safety, and the need for fire precautions, apply equally to new buildings and to any upgrading of, or alterations to, existing buildings.

2.12 The project team should refer to Firecode (England and Wales), or Firecode in Scotland (Scotland) which contains the Department's policy and technical guidance on fire safety in hospitals and other NHS premises. A full list of Firecode documents is provided in Appendix 2. For buildings where the means of escape guidance in Firecode is not

applicable, additional guidance is provided by BS5588: Part 8 'Code of Practice for means of escape for disabled people'.

Upgrading, extending or adapting existing buildings

2.13 The standards set out in this HBN essentially apply to the provision of accommodation in a new building. However, the basic principles are equally valid – and should be applied, so far as is reasonably practicable – when existing accommodation is being upgraded, or when new accommodation is being constructed within an existing building which may have previously been used for other purposes. In some instances, compromises may have to be made between Health Building Note (HBN) standards and what is physically achievable.

2.14 Before any decision is made to carry out an upgrading project, consideration must be given to the long-term strategy for the service, the space required for the new service, and the size of the existing building. Regard must also be paid to the orientation and aspect of the building, whether or not the key HBN requirements can be met – for example, the need for accommodation with ground-level access and the adequacy and location of all necessary support services.

2.15 If a prima facie case for upgrading emerges, the functional and physical conditions of the existing building should be thoroughly examined, including:

- the availability of space for alterations and additions;
- the type of construction;
- any insulation provided;
- the age and condition of the building fabric – for example, external and internal walls, floors, roofs, doors and windows – which may be determined by a condition survey;
- the life expectancy and future adequacy of engineering services, including consideration of ease of access and facility for installating new wiring and/or pipework;
- the height of ceilings (existing high ceilings do not necessarily call for the installation of false ceilings, which are costly and often impair natural ventilation);
- any changes of floor levels, in order to eliminate or minimise any potential hazards for disabled people;
- any physical constraints to the proposed adaptation, such as load-bearing walls and columns.

2.16 When comparing the cost of upgrading or adapting an existing building to that of a new construction, due allowance (in addition to the building costs) must be made for such factors as the cost of demolition and salvage, the cost of relocating people, any costs incurred due to the disruption of services during the phased life of the project, and the temporary additional running costs due to any impaired functioning of areas affected by the upgrading work.

2.17 The cost of any proposed upgrading work should conform to the guidelines indicated in the Department's WKO letter (81)4 (AWO (81)8 in Wales). These guidelines take into consideration the estimated life of the existing building and the difference in cost between upgrading the existing building and constructing a new building.

Building components

2.18 The Building Components Database consists of a series of Health Technical Memoranda (HTMs) which provide specific design guidance on building components for health buildings which are not adequately covered by British Standards. No firms or products are listed. The numbers and titles of the relevant HTMs are listed in Appendix 2 of this volume.

Maintenance and cleaning

2.19 Materials and finishes should be selected to minimise maintenance and be compatible with their intended function. Any finishes that require frequent redecoration, or are difficult to service or clean, should be avoided. At the design stage, special consideration should be given to areas such as entrances, corners, partitions, counters, and any others which may be subjected to heavy use. Floor finishes should be restricted in variety, and, in cases where soft floor coverings are specified and spillage is anticipated, these finishes should have a non-absorbent pile and a backing which is impervious to fluids. Wall coverings should also be robust, and chosen with easy cleaning in mind. (Health Technical Memoranda 56, 58 and 61 provide guidance on these aspects with regard to partitions, internal doorsets and flooring respectively.)

Damage in health buildings

2.20 When designing and equipping health buildings, the likely occurrence and effects of accidental damage should be considered. Damage in health buildings has increased over the years due to the use of heavier mechanical equipment for the movement of patients and supplies and, to some extent, as a result of lightweight, often less robust, building materials. Most damage to doors, and to floor and wall surfaces, is caused by wheeled traffic. Measures to minimise damage should be taken in the form of protective corners, buffers and plates, and to proper continuation of floor surfacing – that is, strong screeds and fully bonded floor coverings. Protective devices should be capable of being renewed as the need arises. Reference should be

made to the relevant British Standards, to the advice in the Department of Health's DS (Supply) letter 42/75 (dated 5 August 1985) regarding the buffering of movable equipment, and to the guidance in HBN 40, Volume 4 ('Circulation areas'). Further information is provided in HTMs 56, 58 and 61.

Signposting

2.21 For general locational recommendations, reference should be made to the ergonomic data sheets and accompanying notes on Signposting in Chapter 6, Volume 1 of HBN 40. HTM 65, 'Health signs', should be consulted for further specific guidance on signage design and practicality considerations.

External environment

Parking areas

2.22 Special parking spaces are required for cars and ambulances. Such spaces should be of sufficient size, both in width and length, to allow unobstructed access, also for vehicles used by disabled people (whether ambulant, in wheelchairs, alone or assisted). In particular, this will necessitate the allocation of considerably more space alongside each parking space, in order to permit the manoeuvring of wheelchairs and the transfer of disabled persons to and from cars. (Some cars are specially adapted with electro-mechanical transfer equipment which is installed in place of some of the car's normal seating arrangements.) The parking and setting-down areas should be level, near the building's entrances, and located to allow the users to reach the entrances without obstruction. The setting-down area for ambulances should be under cover. Reference should be made to HBN 45, 'External works for health buildings'.

2.23 Well-drained, slip-resistant surfaces are required. Any crossovers should be ramped. External doorways should either be free from thresholds and steps, or, if any change in level is necessary, a suitable ramp will be required. The doorway should be wide enough to allow the unobstructed passage of patients in wheelchairs.

2.24 Further guidance regarding the design of car parking areas and associated facilities can be found in the notes to the relevant ergonomic data sheets in Chapter 6, Volume 1 of HBN 40.

Courtyards

2.25 Courtyards enable more rooms to receive natural daylight and ventilation, and provide an outlook which can compensate for the lack of a more extensive view. Suitable layout and planting can help to preserve privacy in surrounding rooms. Ground-cover planting is preferred to grass, as it is often more successful and is generally easier to maintain. Access for maintenance purposes should be from a corridor, so that patients and staff are not disturbed. (Reference should be made to HBN 45, 'External works for health buildings' (1992), for more detailed guidance on the subject.)

Circulation spaces

2.26 Sufficient space should be provided for the movement of wheelchair users – that is, passage through doors and along corridors, also turning and manoeuvring in lobbies, toilets, changing areas and lifts. Changes in level should be avoided, or else ramps should be provided if this is unavoidable; the space where any such change in level occurs should be particularly well lit.

2.27 In order to help the ambulant disabled person, an easy-grip tubular handrail (with a diameter of between 45 mm and 50 mm) should be provided along both sides of a corridor. All doors should be fitted with door closers and rising-butt hinges. Any self-closing doors should be easy to open and capable of being temporarily restrained while the disabled user is passing through. Avoidance of projections and obstructions is particularly important for blind and partially-sighted patients. Items of essential equipment such as fire extinguishers, hose reels and other appliances should either be recessed into the wall or boxed in. Large areas of glass should be clearly marked, at eye level, with a coloured label or contrasted logo at least 150 mm by 150 mm in size. Careful consideration should be given to such matters as the direction of door swings and the siting of radiators, call points and notice boards; these should, while remaining accessible, create minimal (if any) obstruction.

Doors

2.28 Doors and frames are particularly vulnerable to damage from mobile equipment, and materials capable of withstanding such damage should be used. All double swing-doors should incorporate clear glass vision panels, but specific considerations of clinical privacy or safety may require that the panels should be capable of being obscured. Where necessary, doors should be capable of being fastened in the open position. Magnetic door-retainers, where fitted, should not restrict the movement of traffic. Reference should be made to HTM 58, 'Internal doorsets' and HTM 59, 'Ironmongery'.

Windows

2.29 In addition to the various statutory requirements, the following aspects require special consideration when designing a health building: illumination; ventilation; insulation against noise; user comfort (including the prevention of glare); energy conservation. Windows have an important function in health buildings, in providing a

reassuring visual link with the outside world. The building design should ensure that it is possible for cleaners to have easy access to the inside and outside of windows. Specific guidance on types of windows to be used, and in particular their safety aspects, is available in HTM 55, 'Windows'.

Natural and artificial lighting

2.30 A light and pleasant interior is required in a health building, with an adequate level of illumination that can be varied to suit functional activities. Because natural lighting is so variable in quality and quantity, the provision of a comprehensive artificial lighting installation is essential. Sunlight enhances colour and shape, and helps to make a room bright and cheerful. The harmful effects of solar glare can be dealt with by architectural detailing of window shapes and depth of reveals, as well as by installing external and/or internal blinds and curtains. Wherever possible, spaces which are to be occupied by patients, their escorts or staff should have natural daylight, with an outside view. Artificial lighting, as well as providing levels of illumination to suit particular activities, can make an important contribution to interior design in health buildings. Further guidance regarding the provision of lighting is given in Chapter 4 ('Engineering services') of Volume 1.

Internal spaces

2.31 Internal spaces may contribute to economy in planning; if, however, additional artificial lighting and ventilation are then required, both capital and running costs are likely to be increased. Such rooms do not provide good working conditions, and internal spaces should therefore be used only for activities of infrequent or intermittent occurrence or which demand a controlled environment. Rooms that are likely to be occupied for any length of time by staff or patients should have windows.

Ventilation

2.32 Natural ventilation is preferred, unless there are internal spaces or clinical reasons which call for the installation of mechanical ventilation or air conditioning systems, both of which are expensive in terms of capital and running costs: Planning solutions should be sought which take maximum advantage of natural ventilation. The costs of providing mechanical ventilation and air conditioning can be minimised by ensuring that wherever practicable core areas are reserved for rooms whose function specifically requires mechanical ventilation or air conditioning, irrespective of whether their actual location is internal or peripheral. Further guidance regarding ventilation systems can be found in Chapter 4 ('Engineering services') of Volume 1.

Flooring

2.33 Floor coverings and skirtings should contribute to the provision of a non-clinical environment, yet at the same time be hardwearing. They must not present a hazard to disabled people, nor restrict the movement of wheeled equipment. Floors should neither be, nor appear to be, slippery, and their patterning should not induce disorientation. The material used for flooring should be non-reflective. Changes in floor level should be avoided wherever possible. Such factors as surface drag, static electricity, flammability, infection hazards and impermeability to fluids also have to be considered when choosing flooring. (HTM 61, 'Flooring', should be consulted for advice on user requirements and performance selection.) Finishes should be appropriate for the activities to be carried out, also restricted in variety for ease of cleaning and compatible with agreed cleaning routines.

Fittings

2.34 Vertical space considerations will include the positioning of any fitting or equipment likely to be used by a disabled person. This will include door handles, telephones, switches, shelving, handrails, grabrails, wash-basins, soap dispensers, mirrors, coat-hooks and paper-towel dispensers. Reception desks should always be designed so that they are unobstructed for, and accessible to, persons in wheelchairs. Both horizontal and vertical space considerations are detailed in the ergonomic data sheets included in Chapter 6 of this volume.

Information technology

2.35 Information technology (IT) has a central role in health management. The use of computers and telecommunications (computer screens, input devices, printers, fax machines, modems, etc.) – and indeed the rate of technological innovation – continues to increase. Computer workstations must comply with the Health and Safety Executive's Display Screen Equipment Regulations (L26, 1992). Computing expertise is now widely available in the NHS, and project teams should ensure, at an early stage, that they keep themselves well informed concerning current and projected local computing policies, and that their own proposals conform with such policies.

2.36 There are three principal factors which must be considered when providing IT equipment:

- space: computer workstations must be designed to the dimensions which will provide sufficient space for the computer, its peripherals and its operator;

- visibility: computer workstations should be designed and sited so that the room lighting provides satisfactory lighting conditions, giving sufficient and appropriate contrast between the screen and the background environment so that the content of the screen is clearly legible; the ambient lighting, and other sources of light – such as windows and brightly coloured fixtures or walls – should not cause reflections or glare on the screen;
- noise: most modern printers (for example laser and inkjet printers) have acceptable noise levels; if a printer is noisy, a printer hood could be fitted, or alternatively the printer could be located in an easily accessible but separate area.

Security

2.37 Assaults on hospital staff and theft of NHS property should be addressed. The project team should discuss security with the local police Crime Prevention Officer and the hospital or district's security officer or adviser at an early stage in the design of the building. Fire and security officers should be consulted concurrently, as the demands of security and fire safety may sometimes conflict. The attention of planners is drawn to HSG (92)22 (in Wales WHC (92)46) and the revised NHS Security Manual to which it refers, concerning issues of security.

Portering

2.38 The movement of goods or patients to, from or within the building may be beyond the capacity of its occupants; this situation may generate requirements for portering assistance.

Smoking

2.39 NHSME circular HSG(92)41 dated October 1992, 'Towards smoke-free NHS premises', promulgates Government policy set out in the 'Health of the Nation' white paper; it required NHS authorities and provider units to implement policies so that the NHS became virtually smoke-free by 31 May 1993. The circular advises that a limited number of separate smoking rooms should be provided where necessary, for those staff who cannot give up smoking and for those patients who cannot stop smoking. No specific provision has been made in this Note, therefore, for any staff or patients who wish to smoke.

3.0 Critical dimensions

Introduction

3.1 Critical dimensions are those dimensions which are critical to the efficient functioning of an activity; thus, the size of components, their positioning and the space around them may all be critical to the task being performed. Guidance on these dimensions for a particular activity is provided in the form of component-user data sheets. These illustrate components – that is, equipment, furniture and fittings – and provide ergonomic data on the space required for users to move, operate or otherwise use the component; information about the component – for example, fixing heights – and the users' reach – is also provided. Component-user data sheets thus complement the information given on Ergonomic Data Sheets.

Component dimensions

3.2 These relate to the size and position of components, as follows:

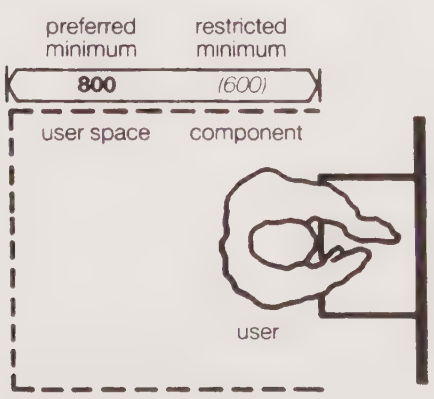
a. Sizes of components are shown thus:

b. Preferred component fixing heights are shown as heights above floor level, thus:

(In some cases an acceptable range of fixing heights is also given in italics.)

Activity dimensions

3.3 Activity dimensions define the user space, which is the minimum space required to perform an activity. Two types of activity dimension are given:

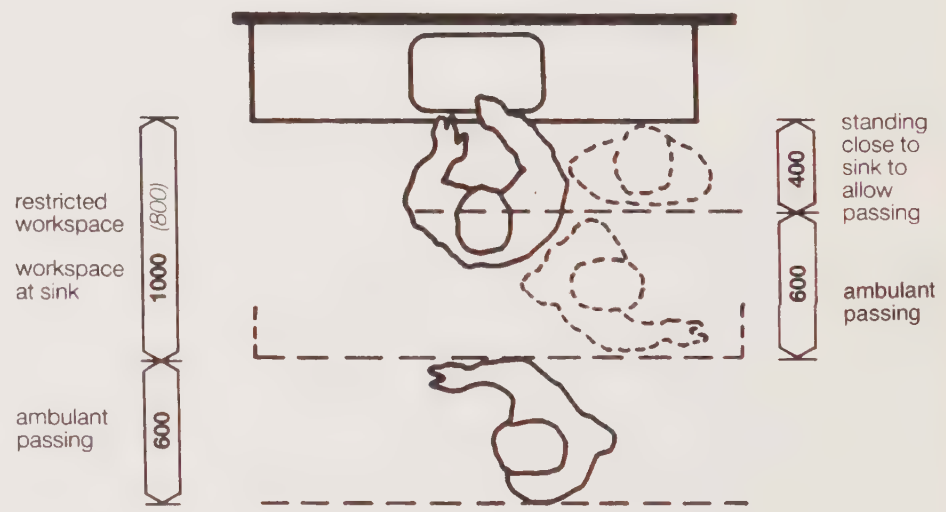


a. *Preferred minimum* – This defines the minimum space required to carry out an activity efficiently, and is shown in bold type;

b. *Restricted minimum* – This will only allow the activity to be performed at the expense of the user experiencing some difficulty. It is not recommended for general application but may be appropriate when considering the overlapping that can be allowed when two user spaces are adjoining.

Selection of activity dimensions

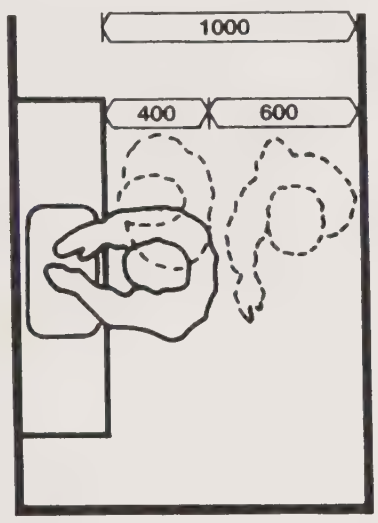
3.4 When using component-user data sheets to design activity space layouts, selection of the appropriate activity dimensions is essential for economy and efficiency. Selection should be based on careful consideration of the frequency, duration, timing and importance of the activities and also the number of people involved. A typical example of the use of a sink showing activity dimensions provided by the component user data sheet is shown below.



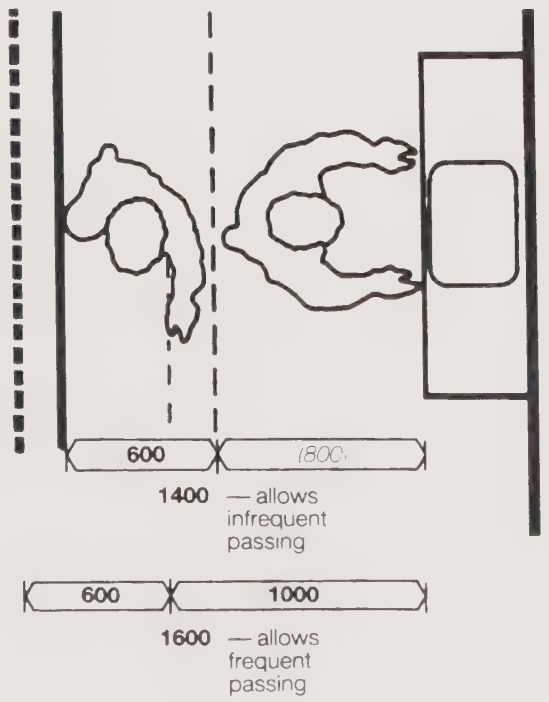
Examples

3.5 The following worked examples show the sink being used in 3 different situations and show how the appropriate dimensions would be selected but do not necessarily relate to this particular Building Note. These examples have been simplified; additional factors such as the movement of mobile equipment may also be critical.

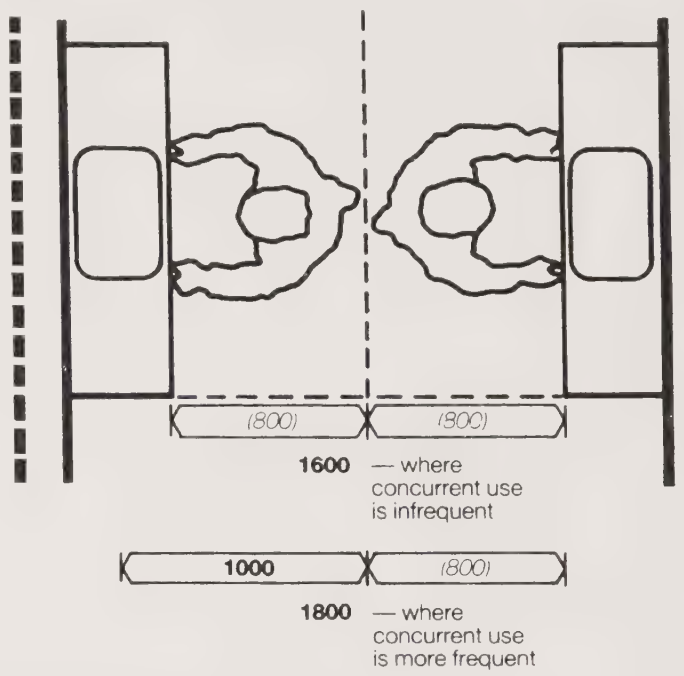
a. If the room is normally occupied by one person only, the 1,000 workspace dimension may be applicable. An (800) restricted dimension should not be used, as this dimension is only applicable where two user spaces are adjoining, not where an individual user space is bounded by a wall or solid obstruction. If the person using the sink stops work and stands close to the sink, 1,000 is also sufficient space to allow a second person to pass, that is 600 + 400.



b. If space is required to allow a person to pass, without the user of the sink stopping work, then the 600 passing dimension is added to the workspace dimension. If passing is infrequent, then temporary restriction of the sink user's space may be acceptable; this gives an overall dimension of 600 + (800) = 1,400. If passing is frequent, and restriction of the sink user's space is not acceptable, the overall dimension is 600 + 1,000= 1,600.



c. Where space has to be provided to enable two sinks to be used concurrently, the overall dimension between sinks will be the sum of the workspace dimensions – for example, if concurrent use is infrequent and of short duration then (800) + (800) = 1,600 may be acceptable. Alternatively 1,000 + (800) = 1,800 allows the full workspace for one sink user and restricted space for the second user, where concurrent use of the sinks is more frequent.



3.6 Note. The passing of a third person between the two sink users may also be critical in this example. Where the sinks are staggered 1,400 may be acceptable, as in example (b).

4.0 Engineering services

The engineering services for the first three volumes of this Health Building Note are described in Volume 1, Chapter 4.

5.0 Cost information

Introduction

5.1 For all types of health building it is clearly of vital importance that building and running costs should be kept as low as possible, consistent with acceptable standards. Within this general context, Health Building Notes provide guidance on the design of a range of accommodation for health buildings which the Department, in conjunction with the National Health Service, recommends for the provision of any given service.

5.2 While using the information given in this section, it is important to note that this information is intended to be used as a standard item for insertion into a separate functional unit (such as an A and E Department) as required.

Works cost

5.3 To prepare an estimate of the works cost for a scheme, reference should be made to the Capital Investment Manual (England and Wales; or Health Building Procurement guidance in Scotland). The total cost allowance for a scheme is then derived by aggregating the cost of the functional units, the Essential Complementary Accommodation (ECAs) and the Optional Accommodation and Services (OAS), as appropriate to the particular scheme.

5.4 The cost allowances cover the building and engineering requirements set out in Volumes 1 to 3 of this Note. In costing the following common spaces, it has been assumed that these areas will be incorporated into a two-storey hospital or other health building where the shared use of engineering services and systems is envisaged.

Functional units

5.5 The Schedule of Accommodation common to the first three volumes of this HBN can be found in Volume 1, Chapter 5. It does not in itself comprise a functional unit, but is to be used as a "menu" of standard items, which can then be inserted into the accommodation schedule for other functional units. This represents an attempt to standardise future HBNs.

Toilets

5.6 The schedule contained within Volume 1, Chapter 5 consists of a range of the most common options available for the formation and calculation of costs for any given functional unit.

Bathrooms

5.7 The schedule contained within Volume 1, Chapter 5 consists of two standard types of bathroom, either of which can be inserted into a given functional unit as required.

Showers

5.8 The schedule contained within Volume 1, Chapter 5 consists of a range of the most common options available for the formation and calculation of costs for any given functional unit.

Dimensions and areas

5.9 In determining spatial requirements for a health building, the essential factor is not the total area to be provided but its critical dimensions – that is, those dimensions critical to the efficient functioning of the activities which are to be carried out at that location. To assist project teams in preparing detailed design solutions for the relevant rooms and spaces, studies – in the form of critical dimensions – have been carried out in order to establish dimensional requirements.

5.10 For development planning purposes, and at the earliest stage of design, it may be convenient for designers to have data available which will enable them to make an approximate assessment of the sizes involved. For this reason, the measurements prepared for the purpose of establishing the cost allowances are included in the associated Schedule of Accommodation, contained within Volume 1, Chapter 5 of this HBN.

5.11 It is emphasised that the measurements given **do not** represent recommended sizes, nor are they to be regarded in any way as specific individual entitlements, but rather purely as ergonomic guidelines.

Circulation areas

5.12 Space for circulation areas has *not* been included within the schedule shown; this will be added to the overall functional unit areas, which have been calculated elsewhere and presented within the HBN relevant to that particular unit. Allowances have been included within the Schedule of Accommodation for the "planning provision", "engineering zone" (adjacent to the external walls), and any small ducts and partitions.

Communication routes

5.13 No allowance for staircases and lifts, or plant rooms, is included in the associated Schedules of Accommodation. These areas are dealt with under the particular overall functional unit to which they belong, standard sizes of which are included within HBN 40, Volume 4.

Engineering services

5.14 The engineering services cost allowances for the first three volumes of this Health Building Note can be found in Volume 1, Chapter 5.

6.0 Example layouts

6.1 Consulting/examination/treatment areas

Consulting/examination room – General

('A' Sheet Code C0201)

Definition

1. An activity space where a patient, who may be ambulant or in a wheelchair, may be interviewed in confidence and examined by a doctor assisted by a nurse or patient's escort, and where certain diagnostic and therapeutic procedures may be carried out.

General points

2. Adequate space must be provided for free movement of patients (including those in wheelchairs) and staff without movement of furniture. Door swings should not be a potential danger at any time.

3. There should be space for the patient to dress and undress, with assistance if necessary, and in privacy. When it is considered necessary to have access to both sides of the couch, reference should be made to the critical dimensions shown in the Type 1 room layout.

4. The doctor should, when seated at the desk, be positioned comfortably to acknowledge a visitor on entry and should not be silhouetted against the window during interview.

5. Items such as a wash basin, an X-ray illuminator and disposal bags should preferably be conveniently located between the consultation and examination areas.

6. Special attention should be paid to ensure privacy during consultation; the provision of soft floor coverings may be considered as an aid in this respect.

7. Clinical quality colour rendering light sources should be provided and walls, ceilings and floors should be of suitable colour and reflectances.

8. Provision of dictating facilities is a project option.

9. In all cases, patient access door sets should be a minimum of 900 mm.

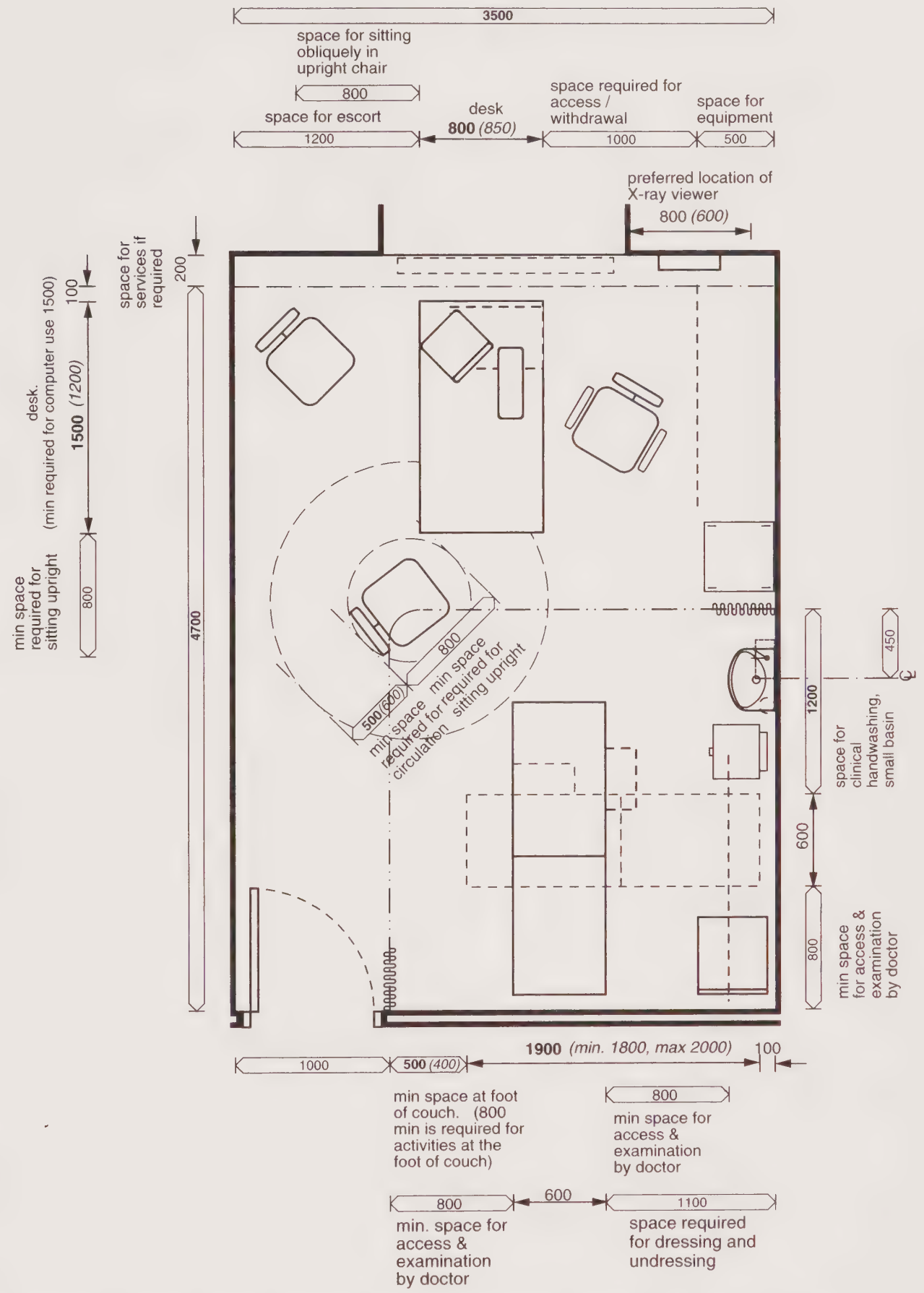
10. Combined consulting/examination rooms, as illustrated here, are considered more economical on space than separate consulting and examination rooms. The combined room has greater flexibility of use and simplifies the allocation of rooms. The combined room facilitates unbroken consultation and, with only one door required, greater acoustic privacy is achieved. The combined consulting/examination room is therefore preferred.

Activities:
An activity space where a patient may be interviewed in confidence and examined by a doctor assisted by a nurse or patient's escort, and where certain diagnostic and therapeutic procedures may be carried out.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Consult / Exam - General Type 1

Users:
Doctor, patient (who may be ambulant, semi-ambulant or use a wheelchair) and escort.



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. The doctor when seated at the desk must not have their back to the door, but positioned so as to comfortably acknowledge the visitor on entry.

2. The desk must not be placed so that the doctor has their back to a window, this can cause their face to be in silhouette thus making it difficult for a visually impaired person to see the doctor's face clearly and a hearing impaired person to lip read.

3. It is psychologically more comfortable if the space in front of the desk for the patient is larger than the space for the doctor behind the desk.

4. The hand wash basin and dressings trolley should be sited in the working area of the doctor so that they can be used without disturbing the patient or escort.

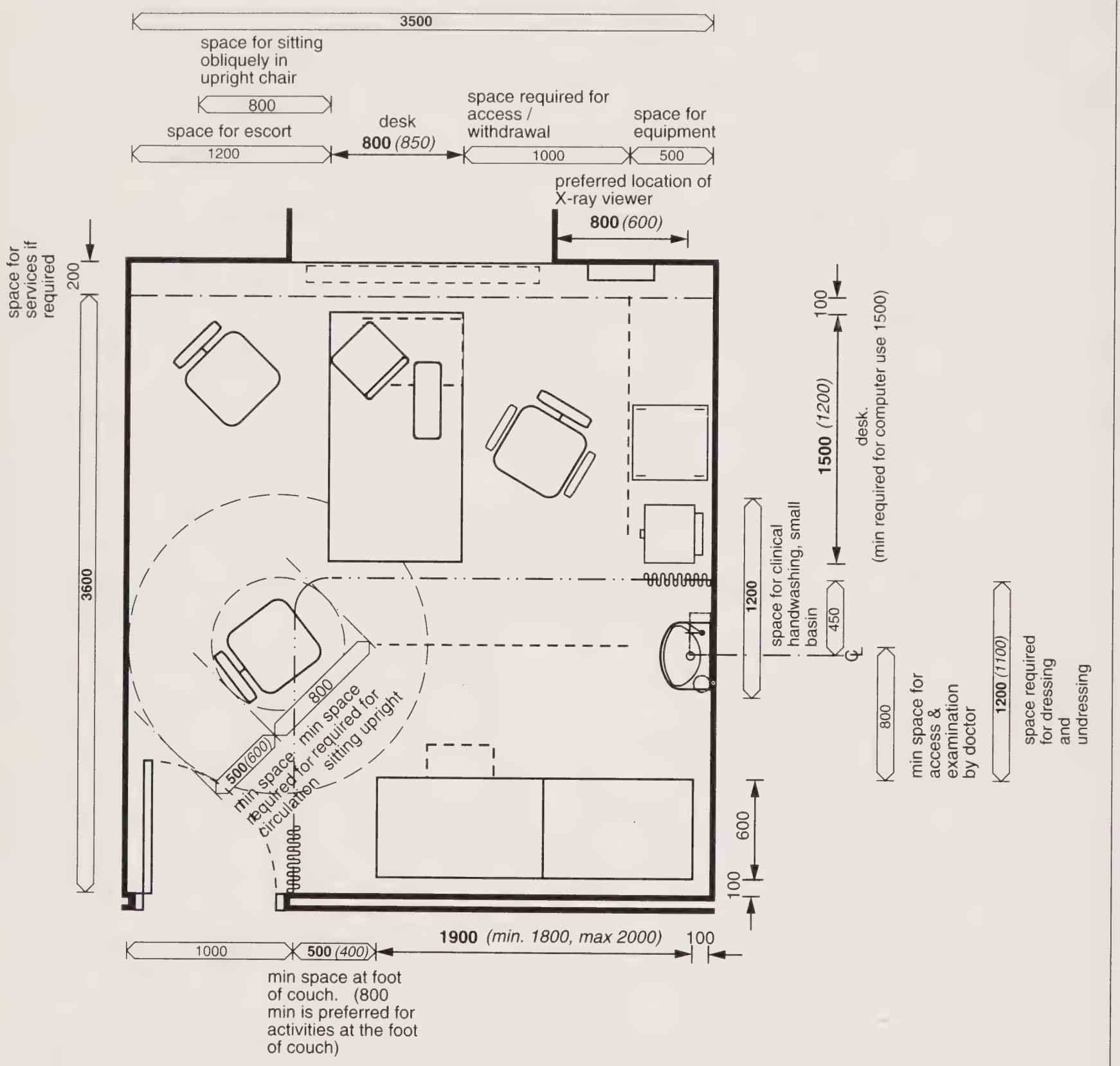
5. The couch should be located so that the doctor can work on the patient's right, or from all sides.

Activities:
An activity space where a patient may be interviewed in confidence and examined by a doctor assisted by a nurse or patient's escort, and where certain diagnostic and therapeutic procedures may be carried out.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Consult / Exam- General Type 2

Users:
Staff, patient and escort



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. The doctor when seated at the desk must not have their back to the door, but positioned so as to comfortably acknowledge the visitor on entry.

2. The desk must not be placed so that the doctor has their back to a window, this can cause their face to be in silhouette thus making it difficult for a visually impaired person to see the doctor's face clearly and a hearing impaired person to lip read.

3. It is psychologically more comfortable if the space in front of the desk for the patient is larger than the space for the doctor behind the desk.

4. The hand wash basin and dressings trolley should be sited in the working area of the doctor so that they can be used without disturbing the patient or escort.

5. The couch should be located so that the doctor can work on the patient's right.

Consulting room – General

('A' Sheet Code C0103)

Definition

1. An activity space where a patient, who may be ambulant or in a wheelchair, may be interviewed in confidence.

General points

2. Separate consulting and examination rooms are considered less efficient in their use of space than combined rooms, and do not provide for the same auditory privacy as combined consulting/examination rooms. While separate rooms may be justified in some areas, combined rooms are preferred.

3. The consulting room is usually in direct communication with one or two examination rooms.

4. Access doors and communication routes should not inconvenience doctor, patient or escort (including those in a wheelchair), and door swings should not be a potential danger at any time.

5. The doctor should, when seated at the desk, be positioned comfortably to acknowledge a visitor on entry and should not be silhouetted against the window during interview.

6. Special attention should be paid to ensure auditory privacy during consultation; the provision of soft floor coverings may be considered as an aid in this respect and connecting doors to examination rooms should adequately reduce sound transmission.

7. Clinical quality colour rendering light sources should be provided and walls, ceilings and floors should be of suitable colour and reflectances.

8. Provision of dictating facilities is a project option.

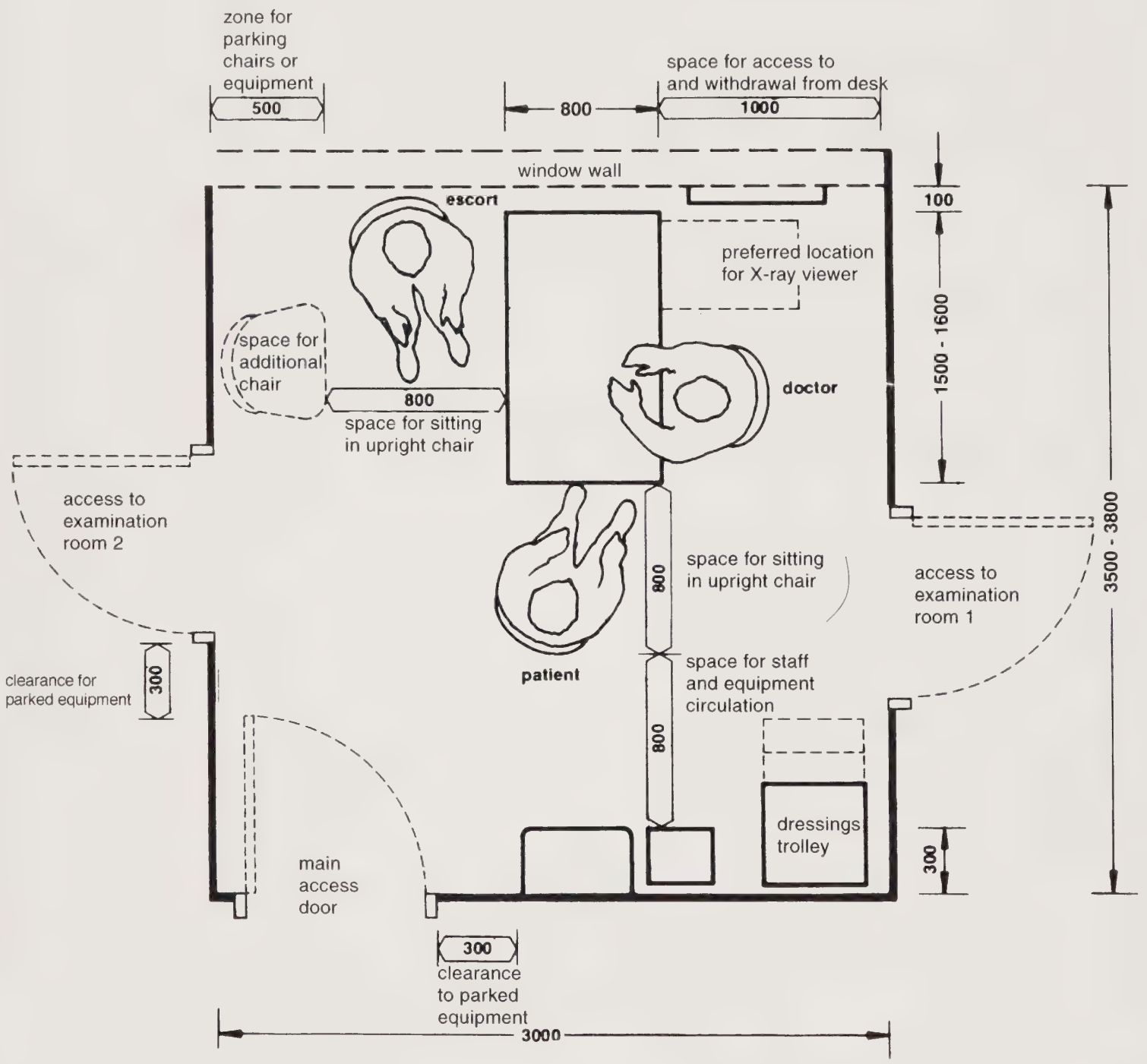
9. In all cases, patient access door sets should be a minimum of 900 mm.

Activities:
Interviewing patient in confidence.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Consulting / Interview

Users:
Staff, patient and escort



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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Examination room – General

('A' Sheet Code C0603)

Definition

1. An activity space where a patient, who may be ambulant or in a wheelchair, may be examined and where certain diagnostic and therapeutic procedures may be carried out.

General points

2. Examination rooms are usually situated in association with a consulting room (see consulting general), but there may also be need for one as a single entity in association with a ward.

3. Access may be required by independent or assisted wheelchair users as well as ambulant patients and there should be space for the patient to dress and undress, with assistance if necessary, and in privacy.

4. Examination should be possible from either side of the couch, without moving furniture.

5. Door swings should not be a potential danger at any time.

6. An X-ray illuminator may be required when the room is not associated with an adjoining consulting room.

7. Clinical quality colour rendering light sources should be provided and walls, ceilings and floors should be of suitable colour and reflectances.

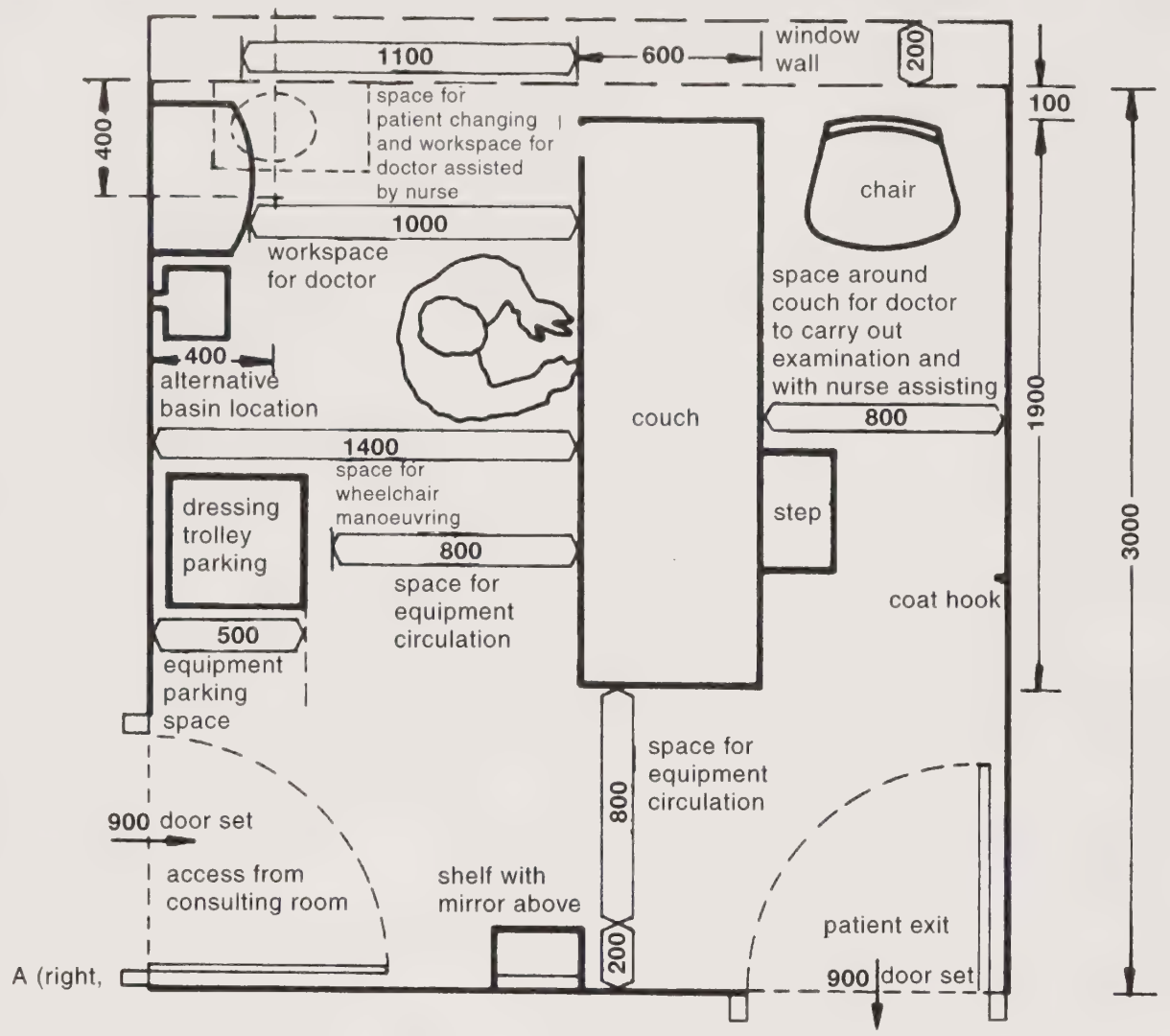
Activities:
Examination of patient, also certain diagnostic and therapeutic procedures may be carried out.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Examination Room

Separate

Users:
Staff, patient and escort



1. Key

Principal couch position

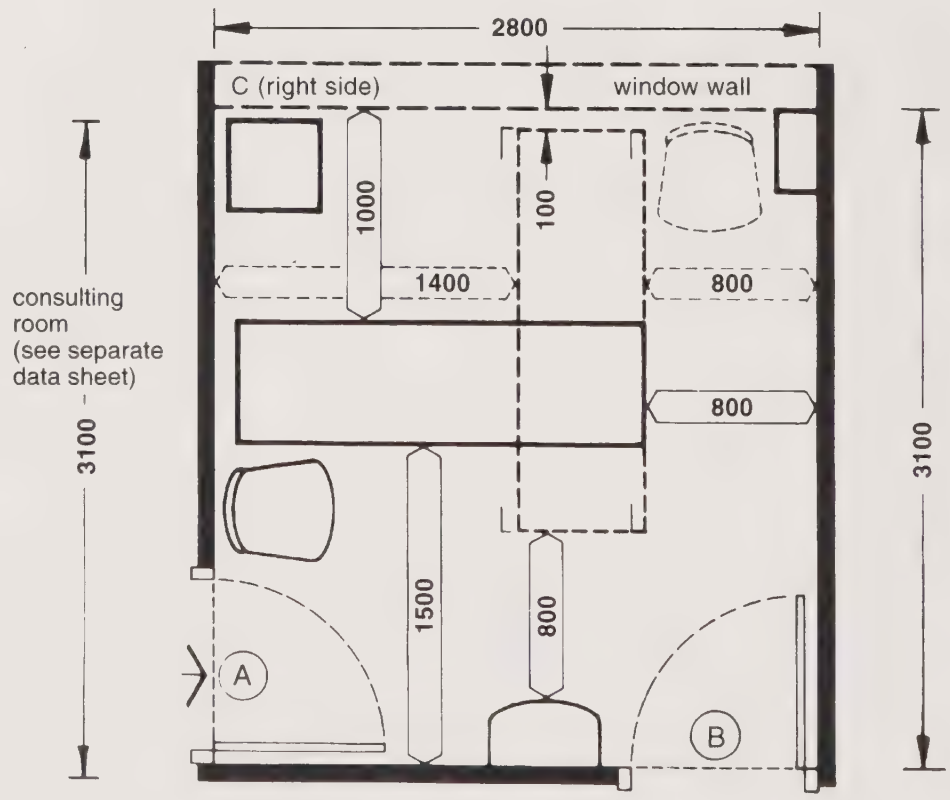
Alternative couch position

Second alternative couch position

A — Access from consulting room

B — Patient exit

2. Where small basin projects more than 300 then room depth or width should be increased accordingly.



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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Treatment room – General purpose

('A' Sheet Code X0103)

Definition

1. An activity space providing facilities for medical and nursing staff to perform procedures requiring a clinical environment, that is, minor operative procedures under local (and occasionally general) anaesthesia.

General points

2. A general purpose treatment room will meet the requirements of most clinical departments, but minor variations may be necessary for certain specialities, for example ophthalmology and ENT. These specific variations should be decided at local level.

3. The patient may be ambulant, in a wheelchair or on a trolley and an appropriate door width must therefore be provided. Door swings should not impede movement or activities within the room, and should not be a potential danger at any time. (See also lobby data sheet requirements.)

4. All-round access to the patient on the couch/patient trolley is essential. Where treatment occurs on a patient trolley, space must be conveniently available either outside or inside the treatment rooms for the unused couch to be temporarily parked away from the essential workspace. (The couch must therefore be mobile.)

5. It is advisable that storage for all supplies should be in an associated clean utility space and not within the treatment area.

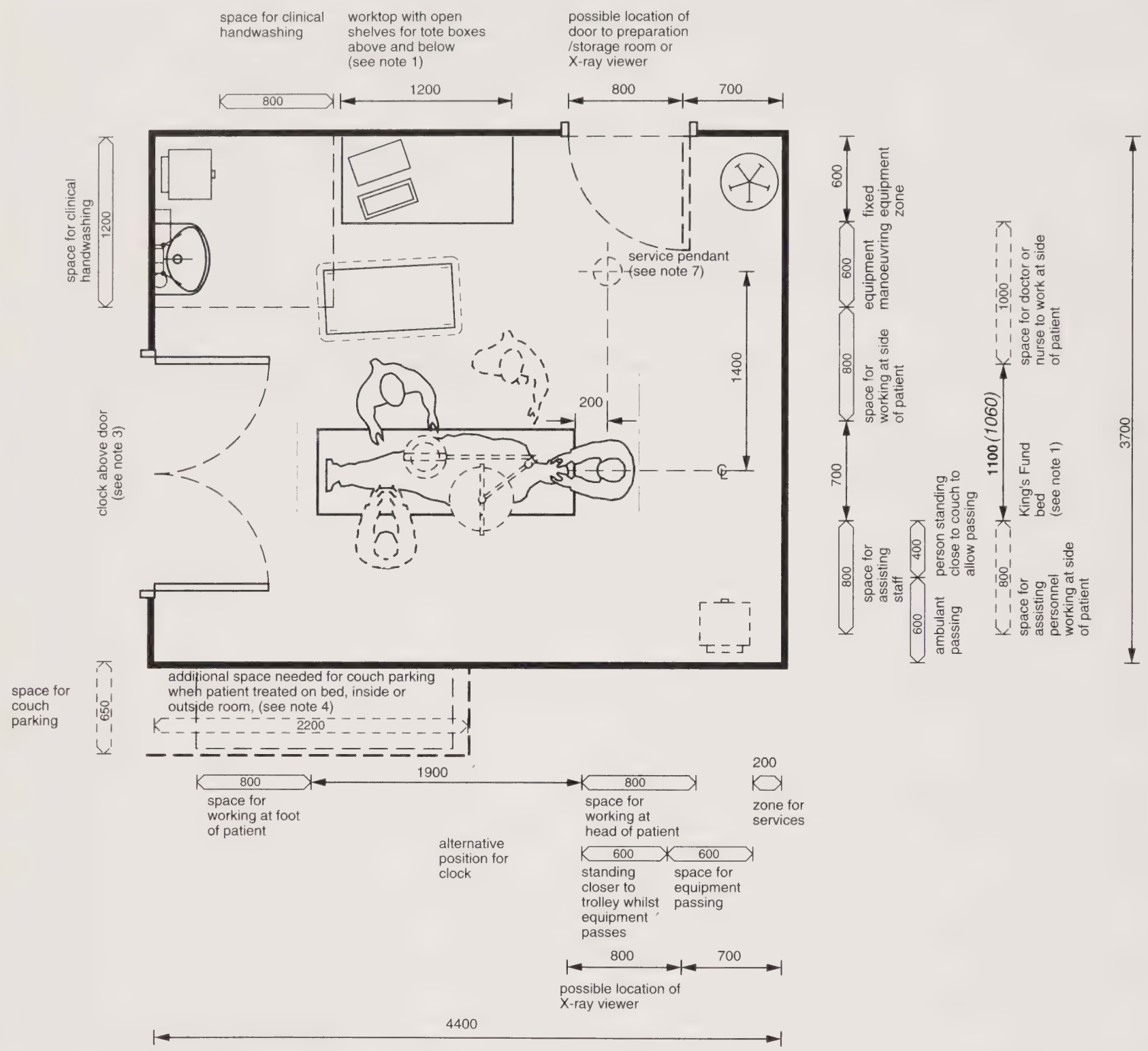
6. Clinical quality colour rendering light sources should be provided and walls, ceilings and floors should be of suitable colour and reflectances.

Activities:
Facilities for medical and nursing staff to perform procedures requiring a clinical environment (i.e. minor operative procedure). The space is also sufficient for; taking X-rays, X-ray viewing. Procedures will be performed by 1-4 staff who may need to work from all sides of the trolley. Facilities for recording patient data and storage of dressings (either on the dressings trolley or elsewhere) and disposal of soiled dressings should be provided, as should facilities for clinical handwashing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Treatment Room 1

Users:
Up to 4 staff and patient (with or without escort), patient may be ambulant, semi-ambulant or in a wheelchair.



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Open shelving with tote boxes are the most appropriate for storage of medical supplies for the treatment room. Shelves should not be higher than 1700. If shelves are provided over a 900 high worktop, the worktop should not be deeper than 600, the shelf depth 300 and the max. shelf height 1650.

2. Space is adequate for the manoeuvring and use of mobile X-ray equipment. If mobile X-rays are to be carried out, consideration should be given to the provision of parking space either inside or outside the room.

3. A clock with second hand sweep is required for monitoring the operating procedures.

4. Treatment may be performed on a patient trolley, on a bed or on a couch. When treatment is performed other than on the couch, it must be temporarily removed and parked outside the essential workspace. This may be outside the room provided it does not cause an obstruction, or inside the room, if the room dimensions are increased to accommodate this.

5. The trolley should be adjustable in height to facilitate patient transfer, especially from a wheelchair, as well as being adjustable for the requirements of the different staff and treatments.

6. To accommodate a King's Fund bed with orthopaedic attachments, both the room dimensions and the clear door opening should be increased.

7. Piped medical gases are not included. However, an appropriate location is shown for a service pendant as a project option.

8. Patient notes could be made on a writing flap or entered onto a computer which should be on a 800 high worktop to facilitate use whilst standing.

9. An emergency call system for the staff and a nurse call system for the patient should be provided.

6.2 Bed/cot care

('A' Sheet codes B01- B20)

Definition

1. The bed space is a living area which contains facilities for the patient to receive medical and nursing care. It may be situated in an activity space making provision for a number of patients, or in a single-bed room.

General points

Multi-bed spaces

2. The number of beds commonly varies between 4 and 6 and there should be a small sitting area. The daily living activities of the patient with each curtained or partitioned bed space require a bed, storage facilities for clothing and personal possessions and a high back easy chair. An over-bed table is also provided.

3. Engineering service outlets, that is, socket-outlets, oxygen, medical vacuum etc, should be provided to meet the clinical requirements of the individual specialty. Bedhead lights, a nurse call system and radio and TV sound channels, which can be controlled by the patient, are also provided.

4. The bed space will need to accommodate various patient, medical and nursing activities and, where necessary, the use of mobile equipment within the privacy of the curtained or partitioned zone. The requirements may vary for certain clinical specialties, but all bed spaces must accommodate the use of trolleys and mobile equipment. The minimum dimensions of each bed space should be maintained at 2.7 m x 2.9 m (long axis of bed) and there should be no intrusions into this space.

5. Clinical handwashing facilities are required within the multi-bed space and it is essential that the space for this activity should not impinge upon any of the individual bed spaces.

6. Whilst the general lighting should be sufficient to satisfy the requirements of patients, medical and nursing staff, the direct illuminance on to a patient bed should be of a low level. Good clinical quality colour rendering light sources should be provided, and walls, floors and ceilings should be of suitable colour and reflectances.

7. The patients should be able to see, speak to and be seen by, nursing staff as they move about the ward. A glazed partition on to the circulation areas, capable of being obscured when privacy is required, could meet patient and staff requirements. The ability to see out to a pleasant view through the windows will enhance the patients' environment.

8. WC and personal washing facilities are required in association with each multi-bed space. Access to them should not disturb other patients, particularly at night. It is recommended that the distance to the nearest WC should not be more than 12 m.

Single-bed rooms

9. The activities and requirements within the single room are similar to those of the multi-bed space, but the patient may be of a higher nursing and medical dependency requiring visual and auditory privacy or segregation for clinical or other purposes.

10. However, it is important that patients, particularly when acutely ill, should not feel isolated as a result of complete loss of visual or other contact. The single room should be located close to the staff base and the partition close to the circulation space should be partially glazed and capable of being obscured from within the room, but this may depend on the policy for the ward under consideration.

11. The self contained space must permit two or more staff to transfer a patient in bed to and from a trolley, and enable the patient to sit out of bed in a wheelchair or armchair, preferably by the window. The minimum critical dimensions indicated on data sheets 1 and 2, must be maintained. Room dimensions greater than those shown on the example layouts may be required for some specialties such as ITU.

12. The provisions of an en-suite WC and shower should be considered at project level. If en-suite WC facilities are not included, they should be provided within a distance of 12 m of any single room.

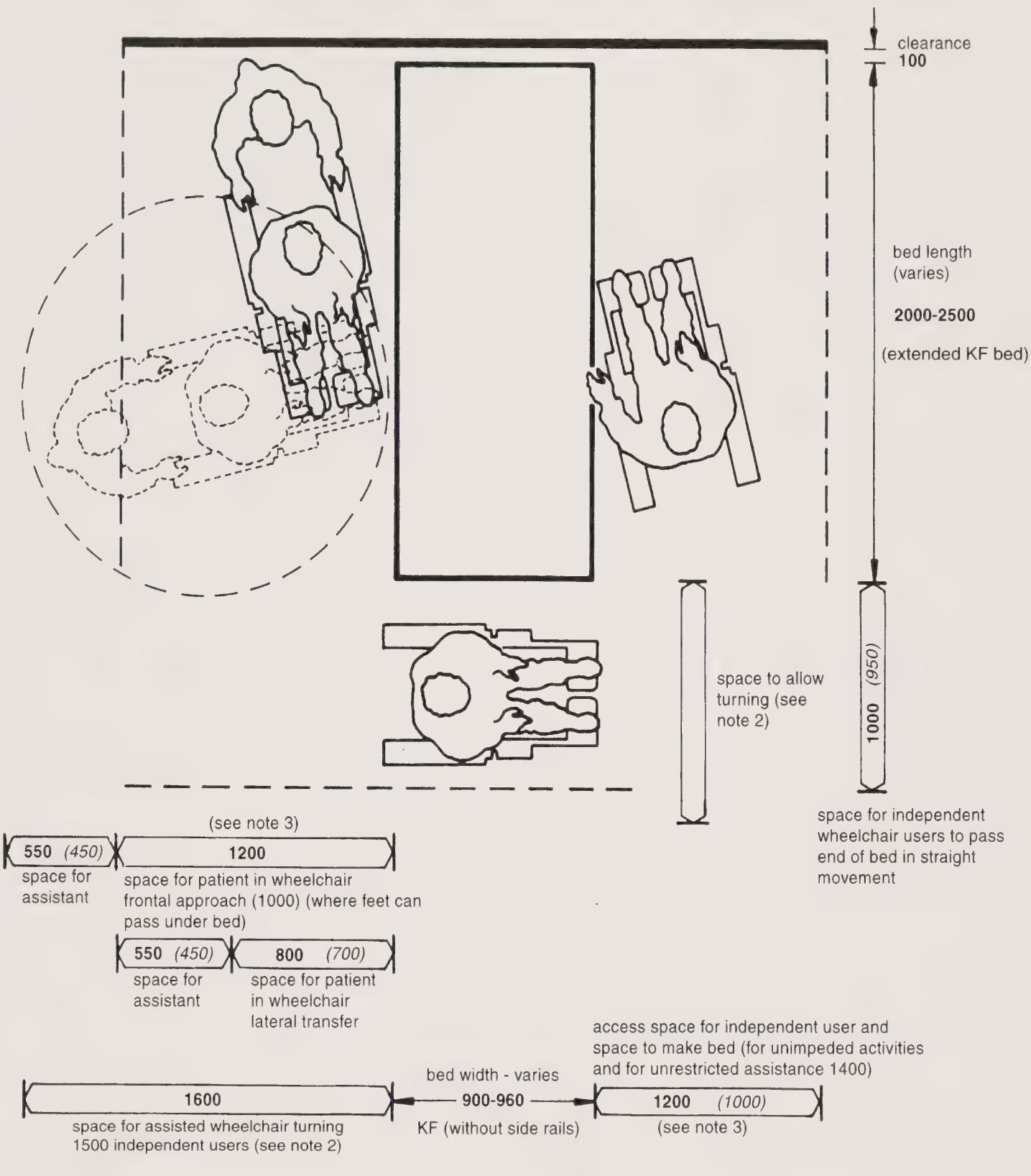
13. Personal washing facilities, suitable for a seated patient, should be provided within each single room. These can also be used by staff for clinical handwashing.

Activities:
Transfer onto and off of a bed, space allows for bed making by independent wheelchair user.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Bed, Various

Users:
Fully ambulant, independent and assisted wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Compressed height of mattress for transfer by wheelchair users is critical and should be equal to the effective seat height of the wheelchair (i.e. 480 or up to 550 with a 100 deep cushion). Where the person stands during transfer a compressed mattress height of 500 is preferred.

2. If space for wheelchair turning is not available to one side of the bed, then turning space should be available nearby.

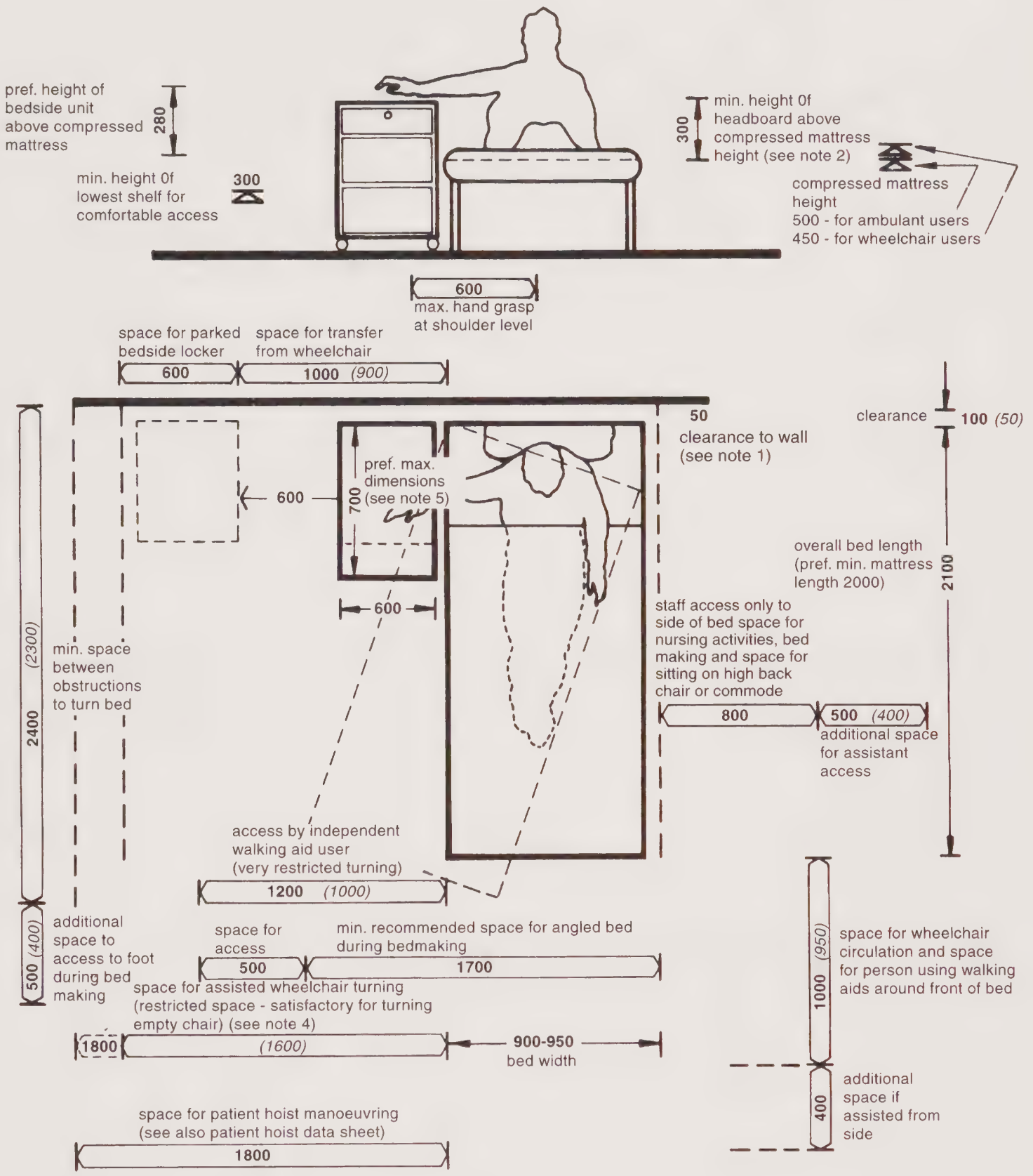
3. Space at foot of bed must be increased to 1400 to accommodate a 90° turn when only (1000) is available at the side of the bed. Similarly, where space at bottom of bed is only (1000), space at side of bed should be 1400. Where space at side of bed is 1200, space at foot of bed should be 1200.

Activities:
Activities around bed in residential accommodation.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Bed, Divan

Users:
Elderly (in residential accommodation)


pref. height of bedside unit above compressed mattress
280
min. height 0f lowest shelf for comfortable access
300
min. height 0f headboard above compressed mattress height (see note 2)
300
compressed mattress height
500 - for ambulant users
450 - for wheelchair users
600
max. hand grasp at shoulder level
space for parked bedside locker
600
space for transfer from wheelchair
1000 (900)
50
clearance to wall (see note 1)
clearance
100 (50)
pref. max. dimensions (see note 5)
600
700
600
overall bed length (pref. min. mattress length 2000)
2100
staff access only to side of bed space for nursing activities, bed making and space for sitting on high back chair or commode
800
500 (400)
additional space for assistant access
min. space between obstructions to turn bed
2400 (2300)
access by independent walking aid user (very restricted turning)
1200 (1000)
additional space to access to foot during bed making
500 (400)
space for access
500
min. recommended space for angled bed during bedmaking
1700
space for assisted wheelchair turning (restricted space - satisfactory for turning empty chair) (see note 4)
1800
(1600)
900-950
bed width
space for wheelchair circulation and space for person using walking aids around front of bed
1000 (950)
additional space if assisted from side
400
space for patient hoist manoeuvring (see also patient hoist data sheet)
1800

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Although beds will occasionally be positioned against the side wall, overall space must be adequate to afford nursing access to both sides of bed when this is necessary.

2. Headboard must be satisfactory as backrest for person sitting up in bed. It should not have sharp corners that could cause injury and should preferably be padded.

3. 750 is a compromise fixed height which would cause least inconvenience to beds at 450 and 500 compressed mattress height.

4. The need for 360° or 180° turns of occupied wheelchair do not occur frequently. 1600 is therefore seen as adequate in most circumstances.

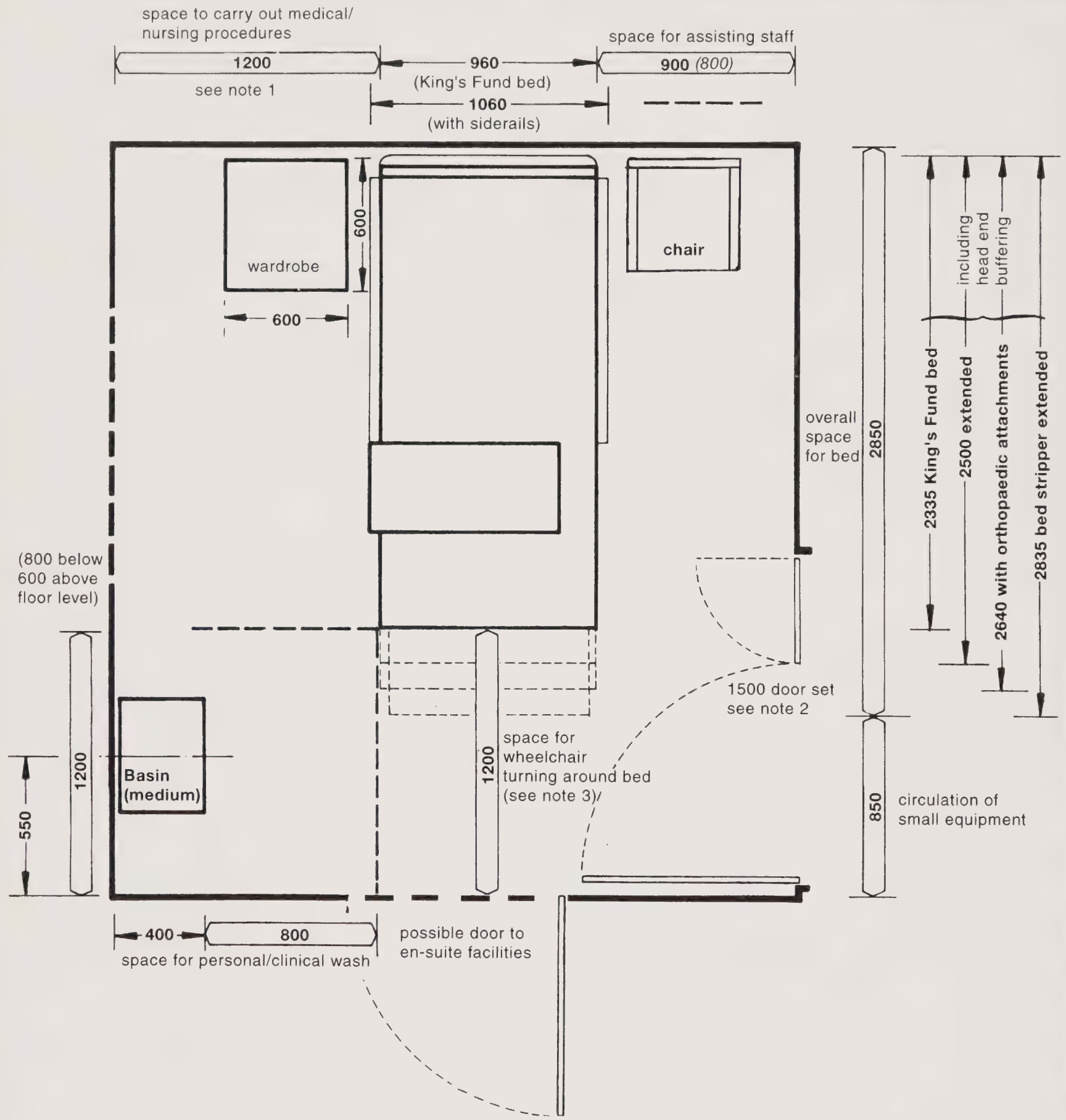
5. The maximum depth of shelves within the locker should not exceed 250.

Activities:
See also alternative layouts, Single bed room 2 data sheet.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Single bed room 1

Users:
Patients, staff and visitors



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Restricted dimension of (900) may be applicable on the principle working side of the bed, but with this layout 1200 is required to allow movement past the foot of the bed due to the basin position (see also alternative layouts).

2. Smaller door sets (e.g. 1200) require more space to facilitate the turning of beds and can be an inadequate clear width for beds with attachments (see data sheets Bed 2-6 Vol. 4).

3. The space at the foot of the bed must allow for 90° wheelchair turning to gain access to the side of the bed, rather than space for straight movement only.

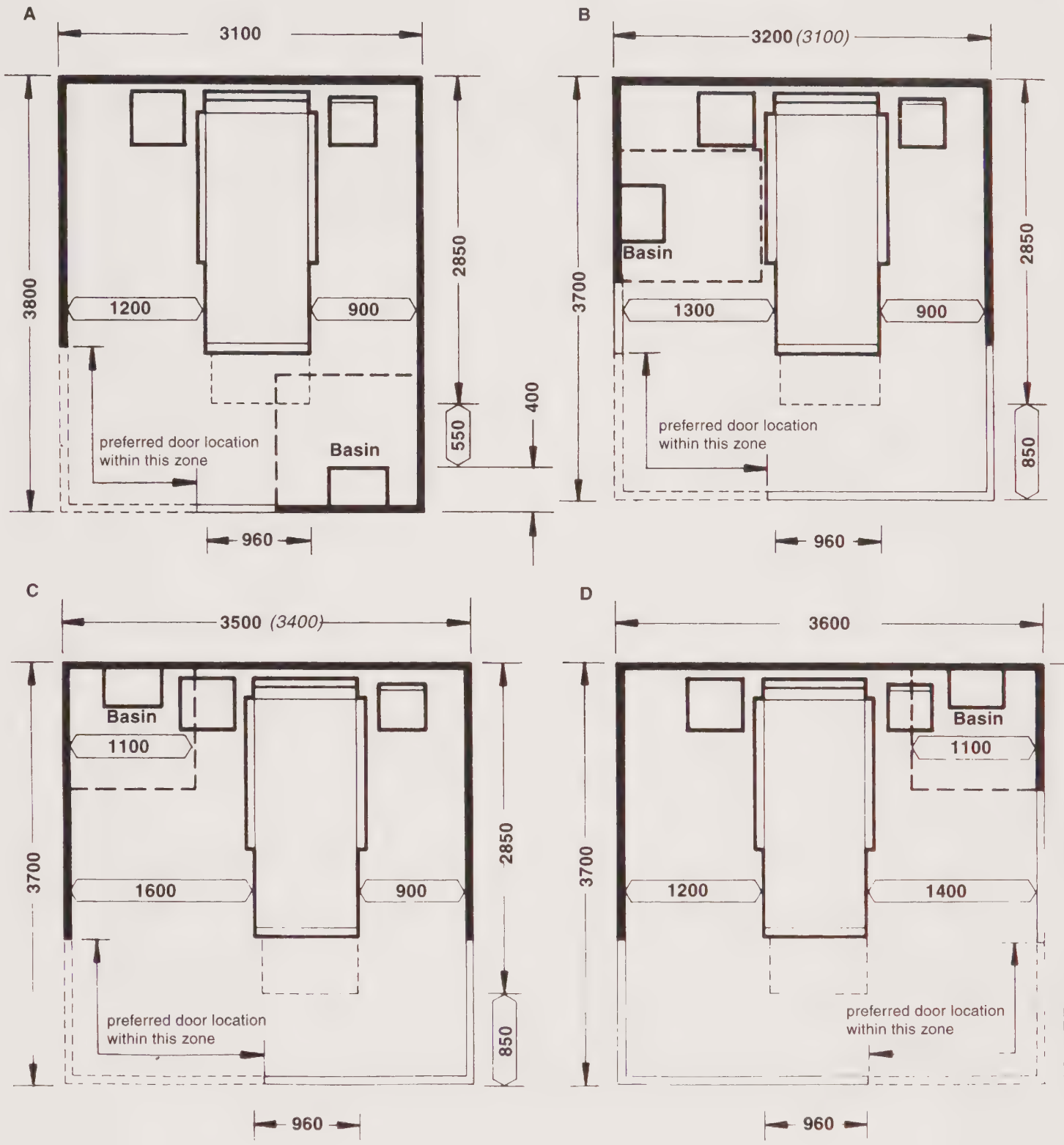
Activities:
See also, Single bed room 1 data sheet.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Single bed room 2

Alternative layouts

Users:
Patients, staff and visitors



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Add for radiator service zone where necessary (approx. 200).

2. The 960 bed width has been taken as 1000 in the additions to give overall widths.

3. All plans assume that wheelchair movement around the foot of bed when bedstripper in use (or overbed table is parked at foot of bed) is not required. All but plan 'A' afford small trolley circulation past the foot of the bed with bedstripper in use. Plan 'A' affords ambulant circulation past basin and bedstripper. (Use of basin is also restricted by bedstripper.)

4. A 1500 minimum door set is recommended, smaller doorsets (e.g. 1200) require more space to facilitate turning of beds and also provide inadequate clear width for the passage of beds with side attachments.

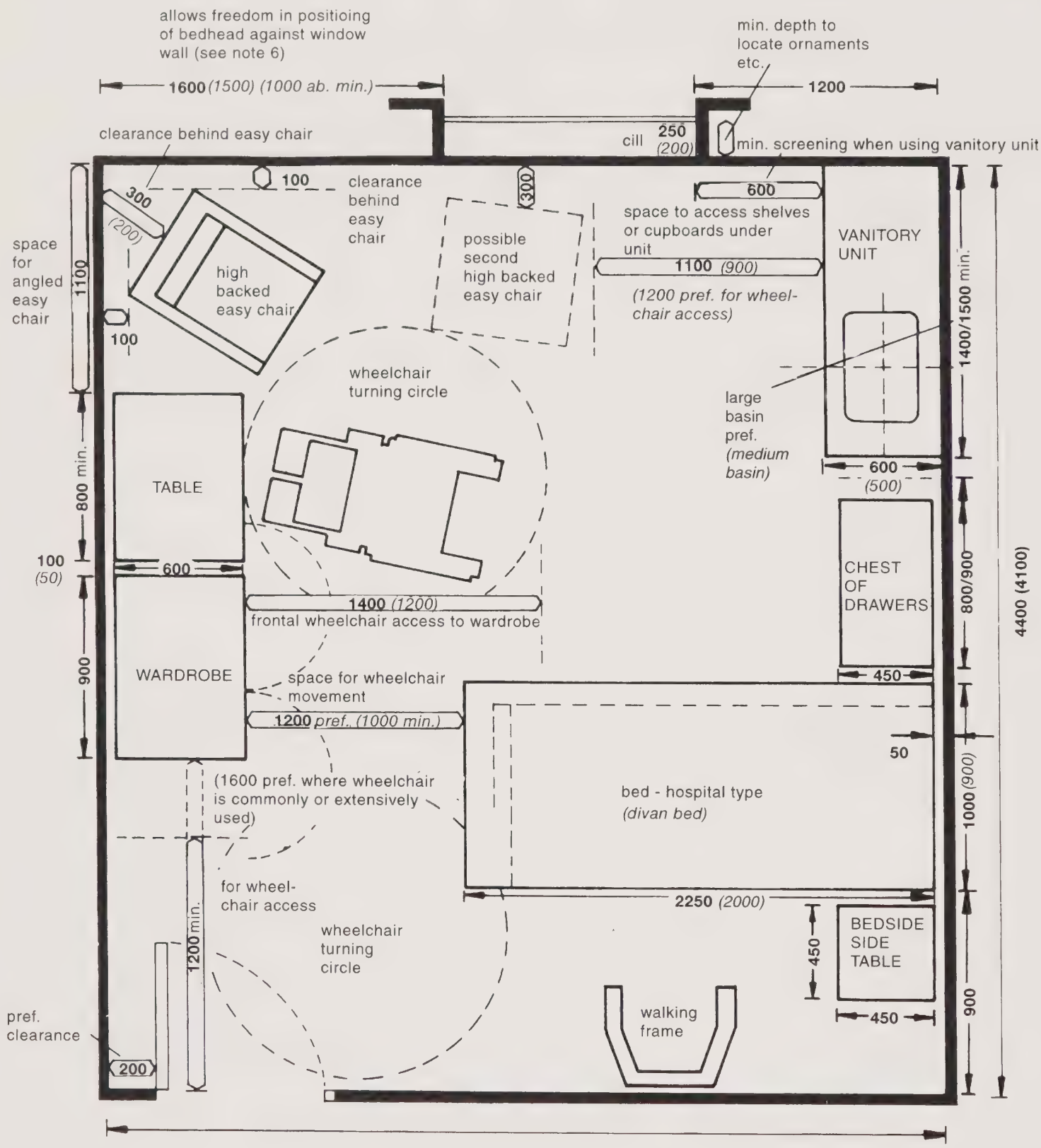
Activities:
Basic living space for elderly ambulant or assisted wheelchair user, including storage of clothing and personal items, and personal washing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Single bed room 3

Accommodation

Users:
Elderly people, staff and visitors



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Since wheelchair users are more likely to have meals in their rooms, it is important that there should be a table for them to eat meals at.

2. For access space to specific items of furniture, see respective component data sheets.

3. High backed chairs should be very stable to reduce the risk of accidents during transfer.

4. If residents have their own furniture, they will be familiar with its use and will not have to get used to using new articles, or learn new techniques.

5. There is some flexibility and room for additional furniture in a room of these dimensions, although the layout shown, does (or could) impose some restrictions on wheelchair movement where the larger bed is included.

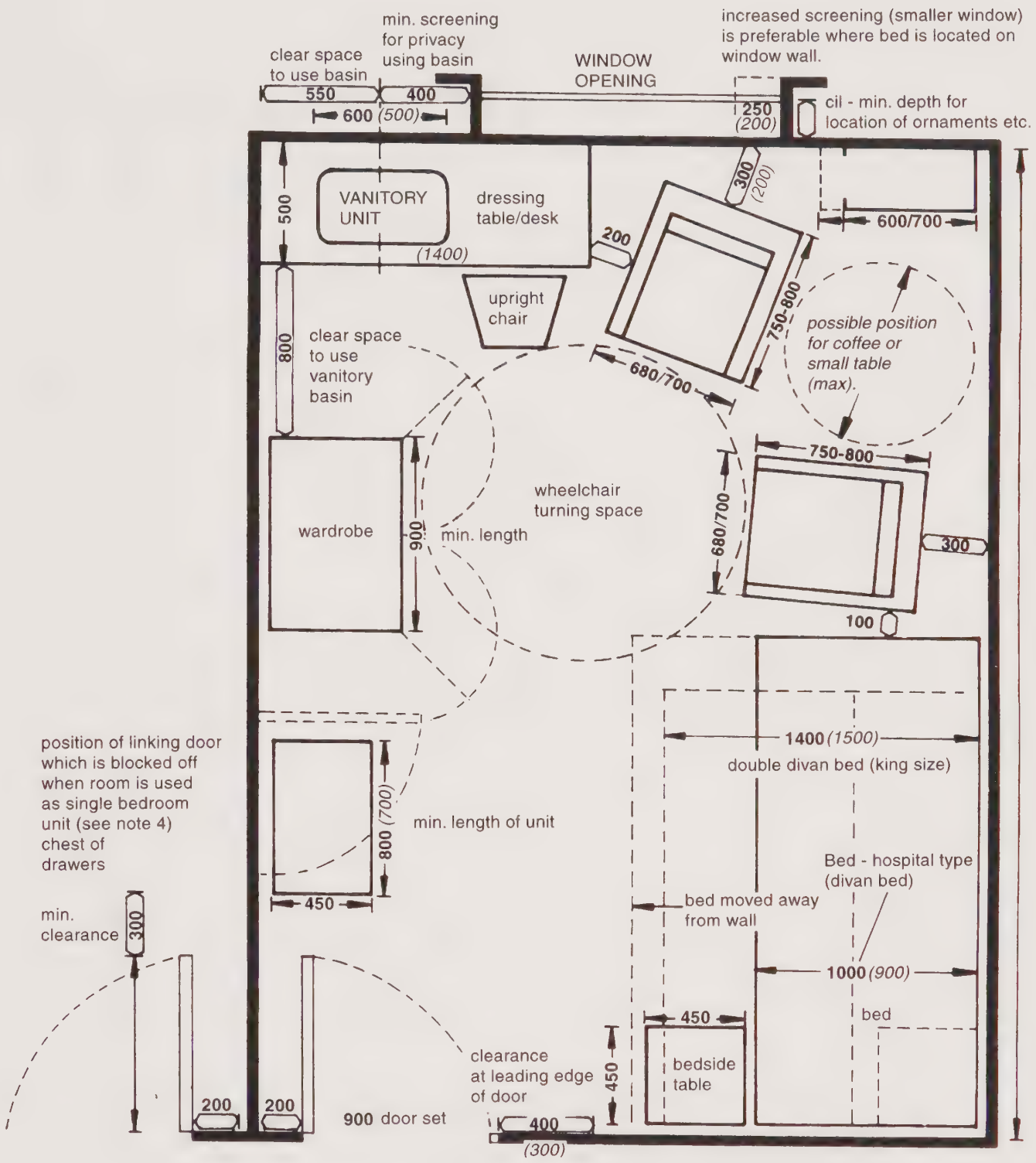
6. The layout of furniture as shown, is preferable, but alternative positions for items of moveable furniture exist. If an alternative arrangement is to be considered, attention must be paid to the space dimensions shown to ensure easy and safe use of items.

Activities:
Basic living space for elderly ambulant or assisted wheelchair user (restricted), including storage of clothing and personal items, and personal washing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Single bed room 4
or double bedroom

Users:
Elderly people, staff or visitors



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. The bed can be moved away from the wall to provide limited access to both sides of the bed. The space will make bed making and moving the bed out easier.

2. Only vanitory unit should be fitted. All other furniture is loose to allow alternative and individual room arrangements to be achieved.

3. Wardrobe doors should open through 180° to aid wheelchair access.

4. It would be possible to have a connecting door between this room and an adjacent sitting room, although necessary extra furniture could be accommodated satisfactorily should this room be used as a double bedroom for a married couple.

5. The layout of furniture as shown, is preferable, but alternative positions for items of moveable furniture exist. If an alternative arrangement is to be considered, attention must be paid to the space dimensions shown to ensure easy and safe use of items.

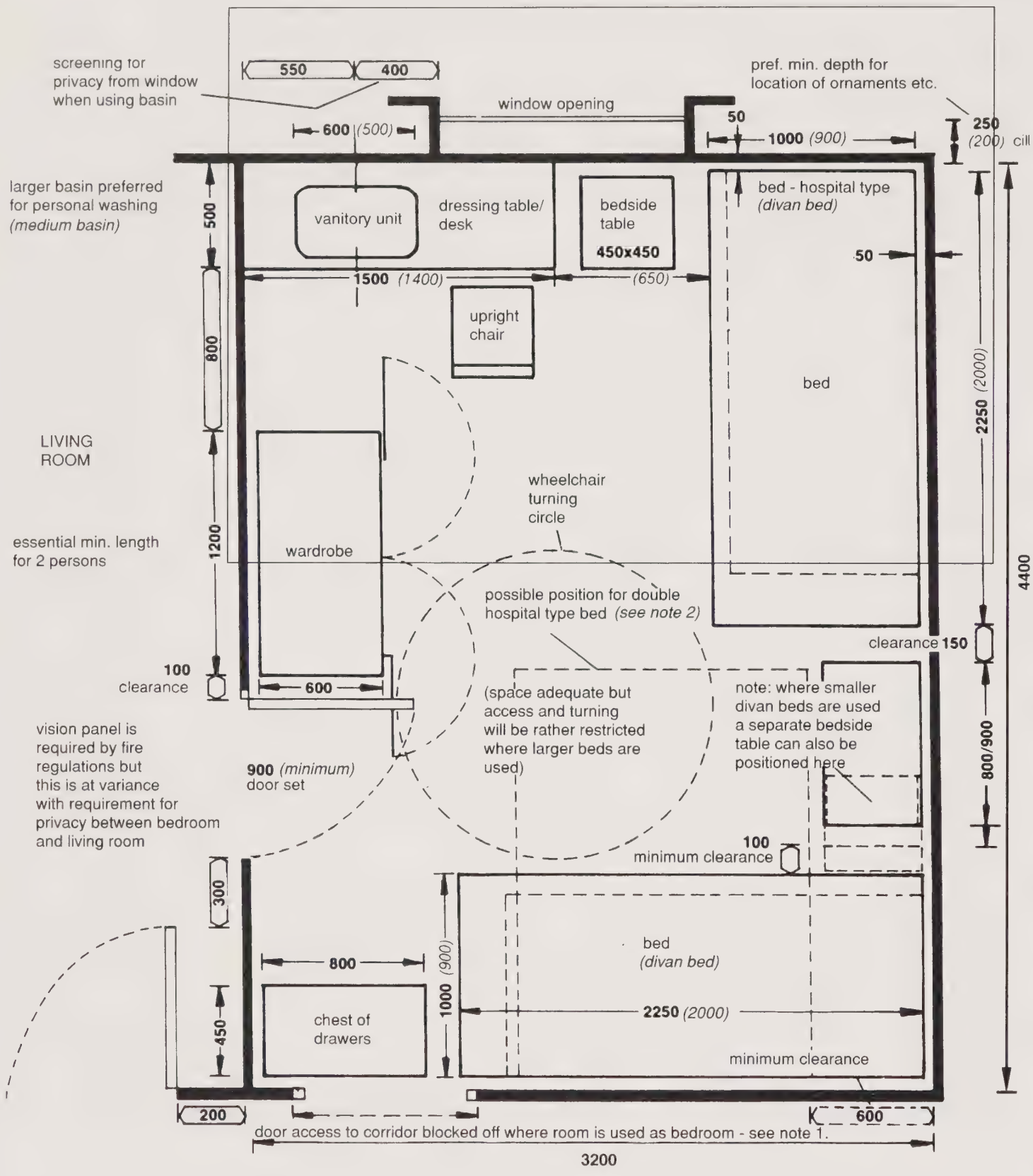
Activities:
Basic living space for married (co-habiting) residents including storage of clothing and personal items, and personal washing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Twin bed room 1

Elderly accommodation

Users:
Elderly people, staff and visitors



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. In order to provide sufficient storage space for two persons, a large wardrobe (1200x600) and additional chest of drawers must be provided. So that these can be accommodated satisfactorily, the door between bedroom and corridor must be blocked off. (This could be achieved by simply removing the door handles and screwing partition panels into position. This would help abate noise and improve the room aesthetically).

2. The two single beds take up a considerable amount of space. Restriction could be slightly reduced if a double bed was used. Married residents should be given the choice to bring their own bed with them if they so desire. This would require re-positioning of other items of furniture in the room to maintain circulation and proper access to chest of drawers and optimise access to wardrobe.

3. Economically and practically it is not desirable to have the connecting door facility inbuilt into every dividing wall. It is recommended that this should be done in only 4 locations in a 40 person home. Twin rooms should not be shared by unmarried (non-cohabiting) residents. All independent residents should have single rooms.

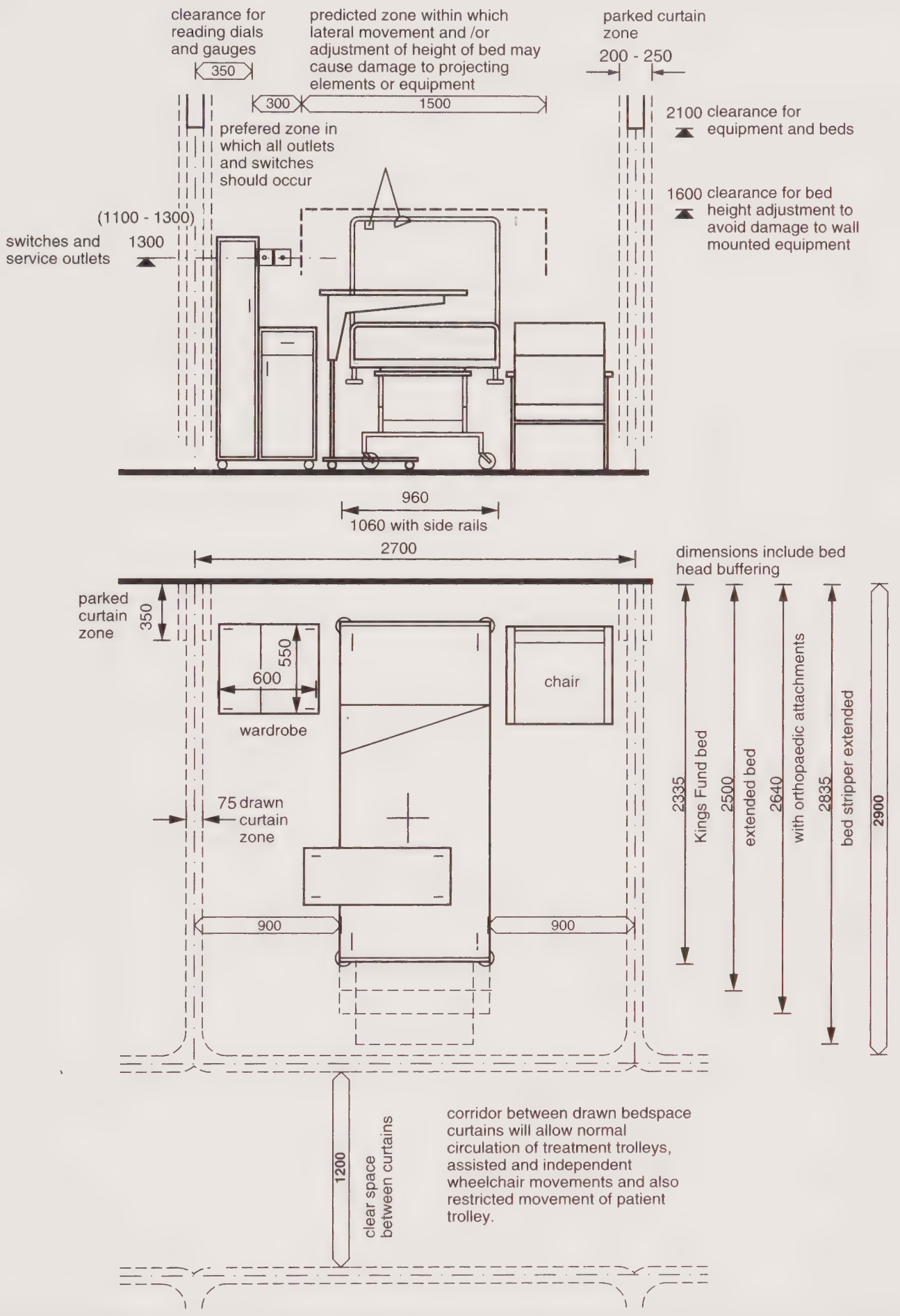
4. The layout of furniture as shown, is preferable, but alternative positions for items of moveable furniture exist. If an alternative arrangement is to be considered, attention must be paid to the space dimensions shown to ensure easy and safe use of items.

Activities:
Space and facilities for staff to provide medical and nursing care safely and efficiently.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Bed Space

Users:
Staff, patients and visitors


clearance for reading dials and gauges
350
predicted zone within which lateral movement and /or adjustment of height of bed may cause damage to projecting elements or equipment
300
1500
parked curtain zone
200 - 250
2100 clearance for equipment and beds
1600 clearance for bed height adjustment to avoid damage to wall mounted equipment
prefered zone in which all outlets and switches should occur
(1100 - 1300)
switches and service outlets
1300
960
1060 with side rails
2700
dimensions include bed head buffering
parked curtain zone
350
600
550
wardrobe
chair
75 drawn curtain zone
900
900
2335 Kings Fund bed
2500 extended bed
2640 with orthopaedic attachments
2835 bed stripper extended
2900
1200
clear space between curtains
corridor between drawn bedspace curtains will allow normal circulation of treatment trolleys, assisted and independent wheelchair movements and also restricted movement of patient trolley.

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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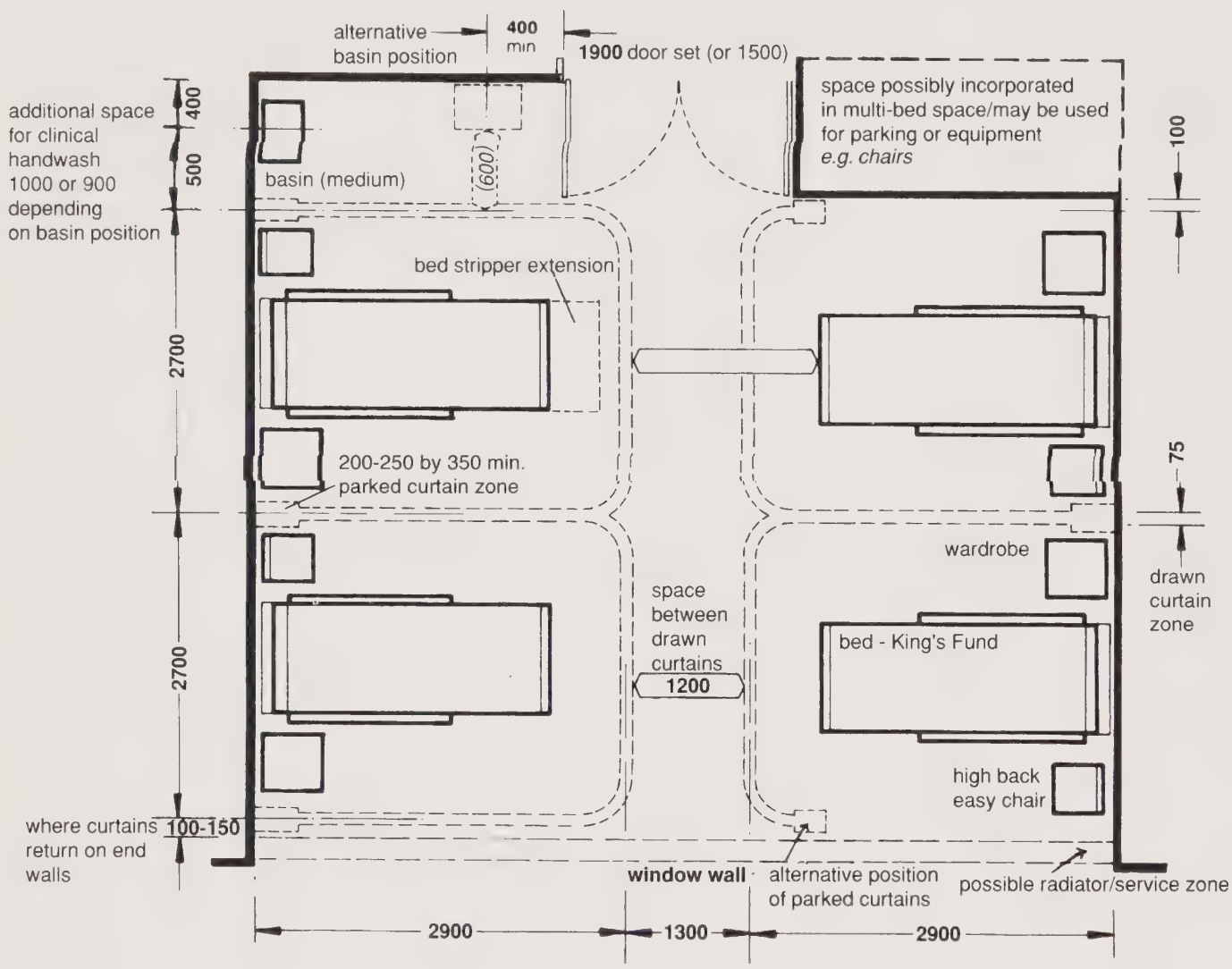
Activities:
Space and facilities for staff to provide medical and nursing care safely and efficiently.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

4 Bed space

Users:
Staff, patients and visitors



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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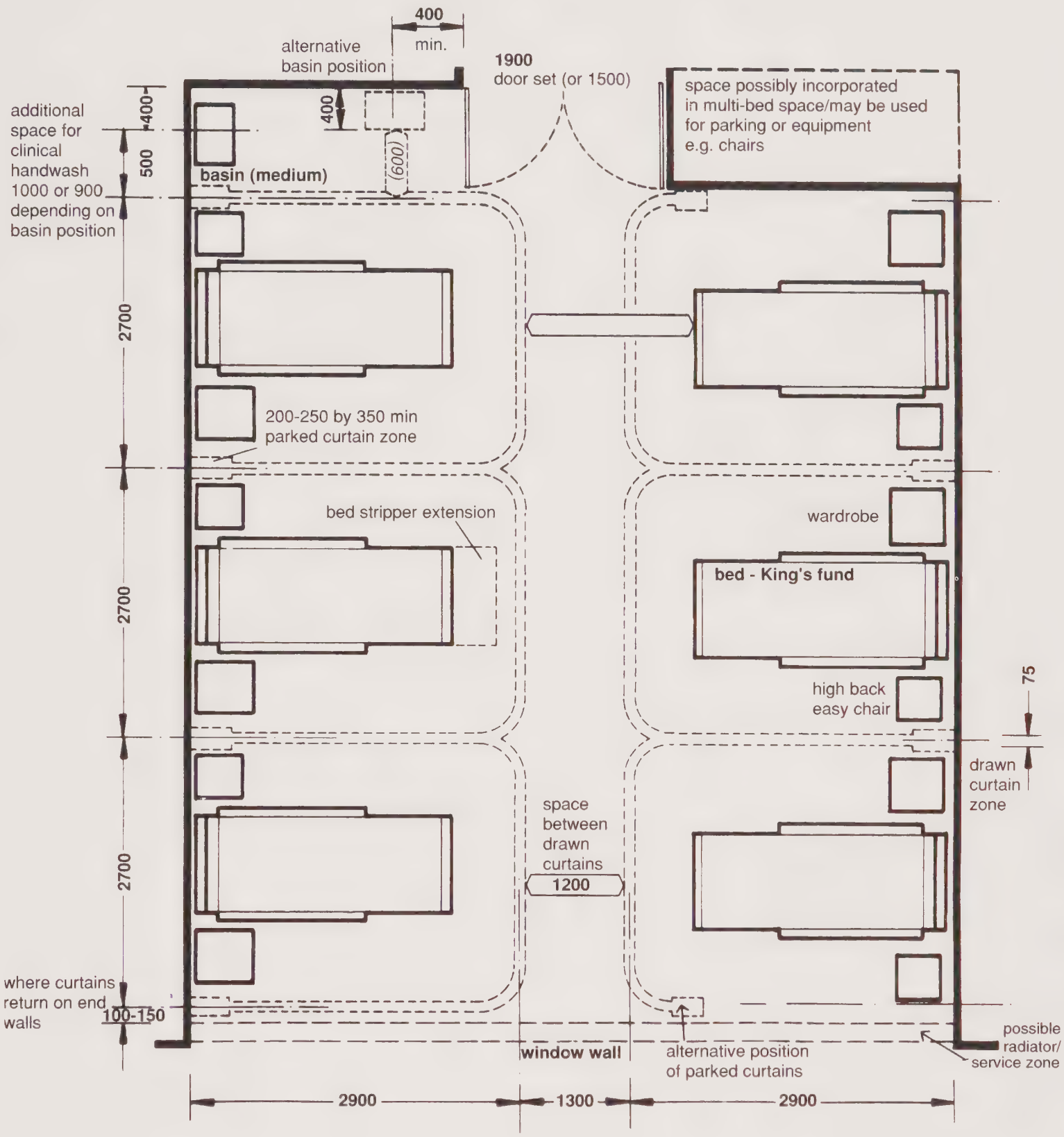
Activities:
Space and facilities for staff to provide medical and nursing care safely and efficiently.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

6 Bed space

Users:
Staff, patients and visitors



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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6.3 Patient hoists

General points

1. In January 1993 the Manual Handling Operations Regulations 1992 came into force. The Regulations reflect the widely held view that injuries as a result of manual handling activities at work are largely preventable. A risk assessment must be made and appropriate steps identified and implemented to reduce the risk of injury to the lowest level reasonably practicable.

2. Few other employment sectors are likely to undertake the range and volume of manual handling tasks found within the health services. Thus, guidance has been prepared to assist employers within the health services to fulfil their duties by providing specific advice on manual handling tasks encountered in this work sector.

3. The provision of appropriate hoists, training in their use and space to use them efficiently is extremely important if health buildings are to be within the law and avoid unnecessary ill health and expenditure.

4. Adequate and well designed space is imperative to use a hoist efficiently and safely. Even a well designed hoist will not be used if there is insufficient space to manoeuvre it and injuries might be sustained by manoeuvring a hoist in a confined space.

5. Other equipment that the hoist is used in conjunction with, for example, the bed, chair, bath, toilet and shower should also be chosen to be compatible with the hoist, otherwise it will not be able to be used effectively and safely.

6. The patient should be able to be moved by hoist in a comfortable and dignified manner. For a patient who is ill, in pain and possibly confused, being transferred by hoist can be very frightening, painful, uncomfortable and degrading.

7. Hoists with seats are generally preferred over hoists with slings. This is because:

- the former are easier for transferring the patient on and off;
- it can be very uncomfortable to be transferred onto the slings since arranging the slings under the buttocks and thighs can pull on frail skin;
- slings can be very time consuming and fiddly to fit; mistakes can easily be made and the patient still has to be lifted or rolled onto the slings. It can cause concern to watch the staff fiddling with the straps of a sling and the chains of a hoist;
- the design of the slings can mean the patient is moved over a distance with their legs open which, particularly for female patients, can cause great distress;
- in a sling the patient cannot always see where he/she is going – to be transported through the air, swinging in the sling with one's legs open and not being able to see where one is going can be a very frightening experience;
- slings can easily become soiled and will have to be cleaned in the laundry system, thus spare slings are required, whereas a hoist with a seat can be thoroughly washed down on the ward ready for use by the next patient;
- when using a hoist to bath a patient the slings will become wet. This can be uncomfortable for the patient and spare slings will be required so that the hoist can still be used whilst the slings are drying. A hoist with a plastic seat can be quickly and easily dried with a towel;
- slings can interfere with drainage bags, catheters etc.;
- it should be easy for staff to adjust the patient's clothing whilst they are on the hoist, for example for taking someone to the toilet. This can be very awkward with slings but somewhat easier with a hoist with a seat design.

8. The raising and lowering of the patient should be as smooth and gentle as possible so as not to cause discomfort and distress. Thus battery operated or hydraulically operated hoists are recommended since manually adjustable hoists can take time, be tiring to use and mean that staff are not standing in the best location relative to the patient.

9. The storage location for a battery operated hoist must have a socket-outlet for keeping the battery charged or a shelf with a socket for storing and charging a spare battery.

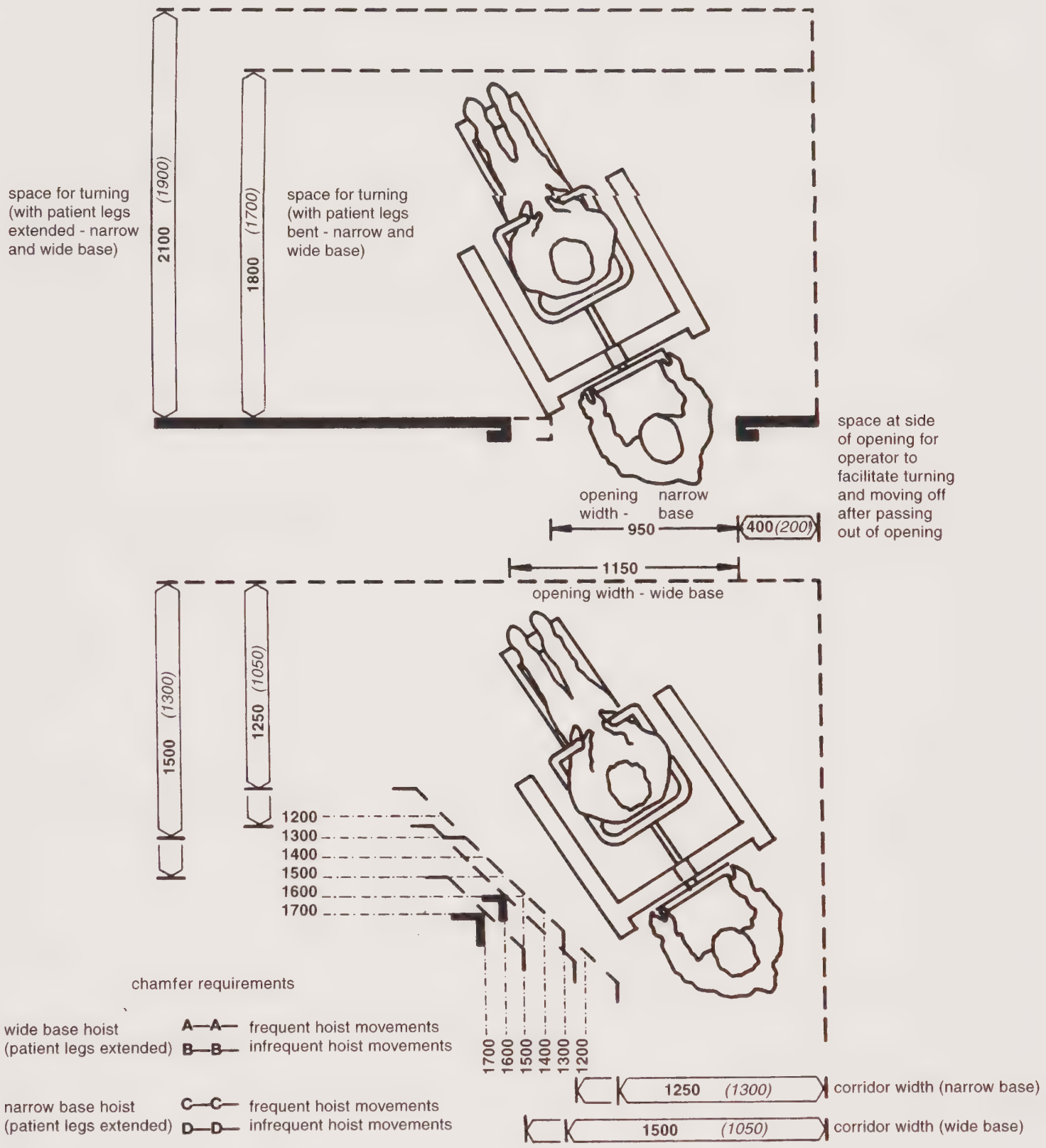
Activities:
Space to turn into and out of an opening of minimum width (1150mm for wide base hoist and 950mm for narrow). Space to turn patient through 90° bend.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Patient Hoist 1

Mobile chair (wide or narrow base) turning 90°

Users:
1 staff (moving hoist)


space for turning (with patient legs extended - narrow and wide base)
2100 (1900)
space for turning (with patient legs bent - narrow and wide base)
1800 (1700)
space at side of opening for operator to facilitate turning and moving off after passing out of opening
opening width - narrow base
950
400 (200)
1150
opening width - wide base
1500 (1300)
1250 (1050)
1200
1300
1400
1500
1600
1700
chamfer requirements
wide base hoist (patient legs extended)
A—A frequent hoist movements
B—B infrequent hoist movements
narrow base hoist (patient legs extended)
C—C frequent hoist movements
D—D infrequent hoist movements
1250 (1300) corridor width (narrow base)
1500 (1050) corridor width (wide base)

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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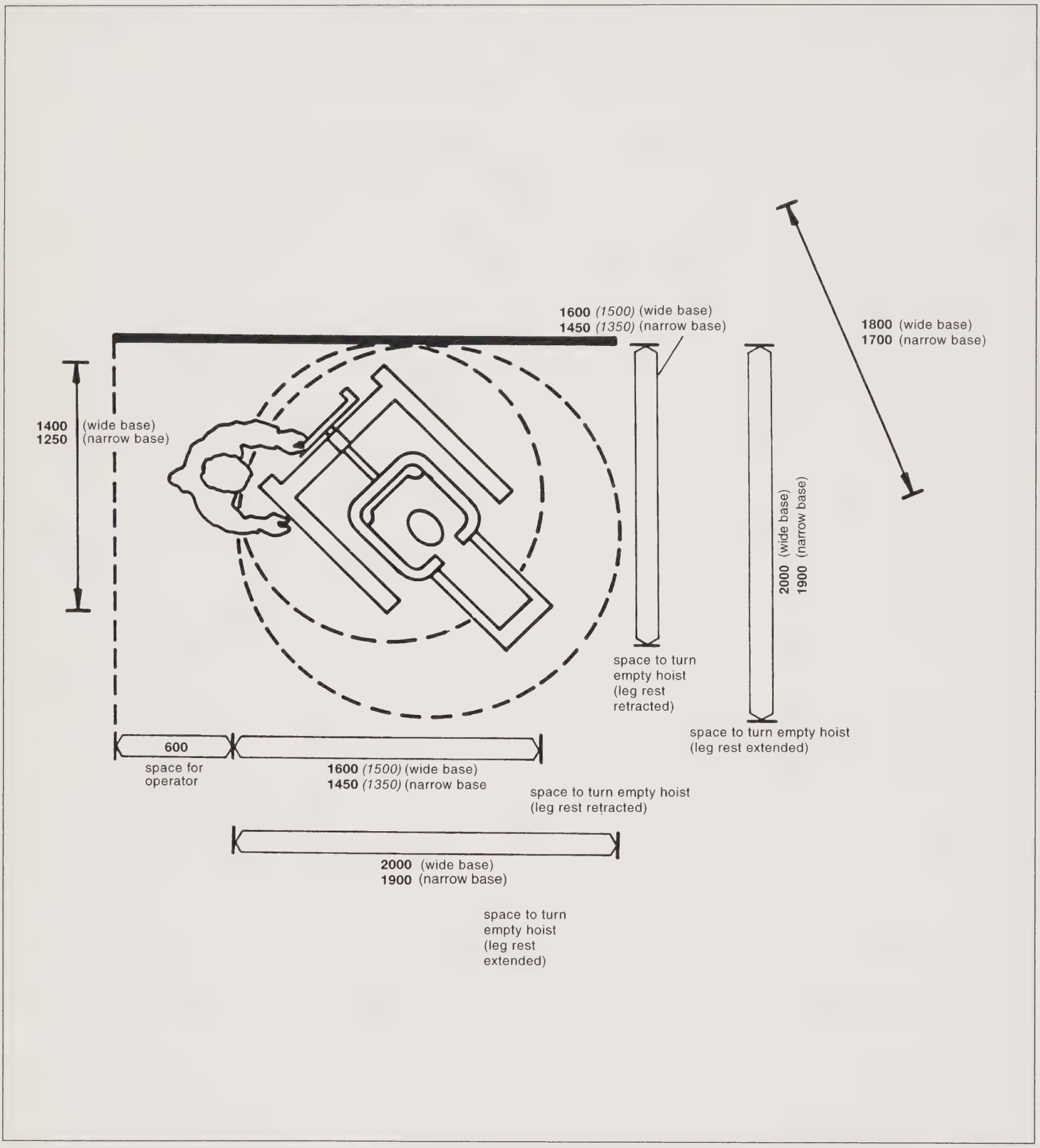
Activities:
Turning hoist and patient through 90° and 180°. Rotating hoist only.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Patient Hoist 2

Mobile chair turning 90° + 180°

Users:
1 staff (moving hoist)


1600 (1500) (wide base)
1450 (1350) (narrow base)
1800 (wide base)
1700 (narrow base)
1400 (wide base)
1250 (narrow base)
2000 (wide base)
1900 (narrow base)
space to turn empty hoist (leg rest retracted)
space to turn empty hoist (leg rest extended)
600
space for operator
1600 (1500) (wide base)
1450 (1350) (narrow base
space to turn empty hoist (leg rest retracted)
2000 (wide base)
1900 (narrow base)
space to turn empty hoist (leg rest extended)

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

1. Extended leg rests can be retracted to reduce space necessary for rotating empty hoist.

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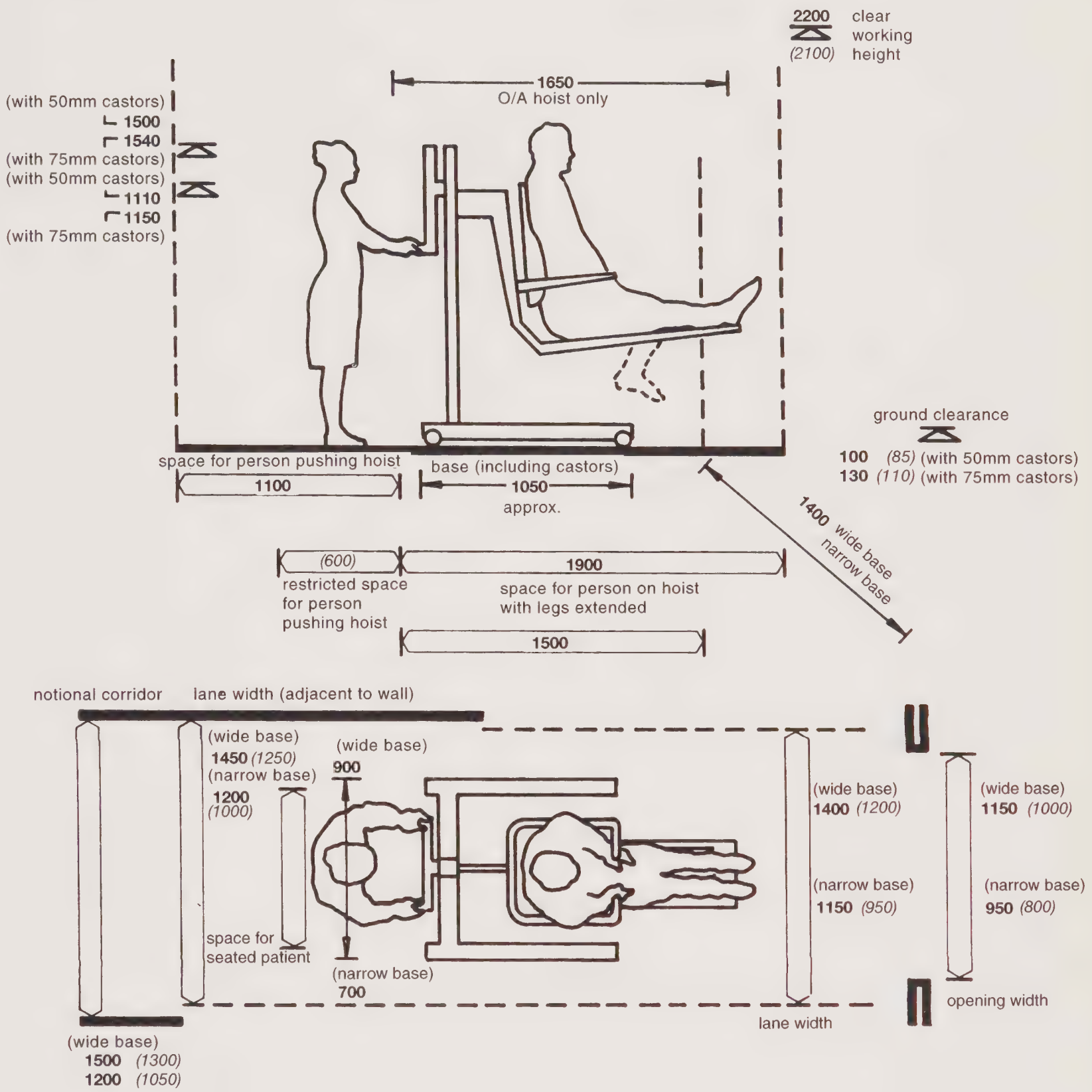
Activities:
Straight movement of a patient in a hoist (e.g. to and from a bathroom).

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Patient Hoist 3

Mobile chair (wide or narrow base) to and from bathroom

Users:
1 staff (moving hoist)



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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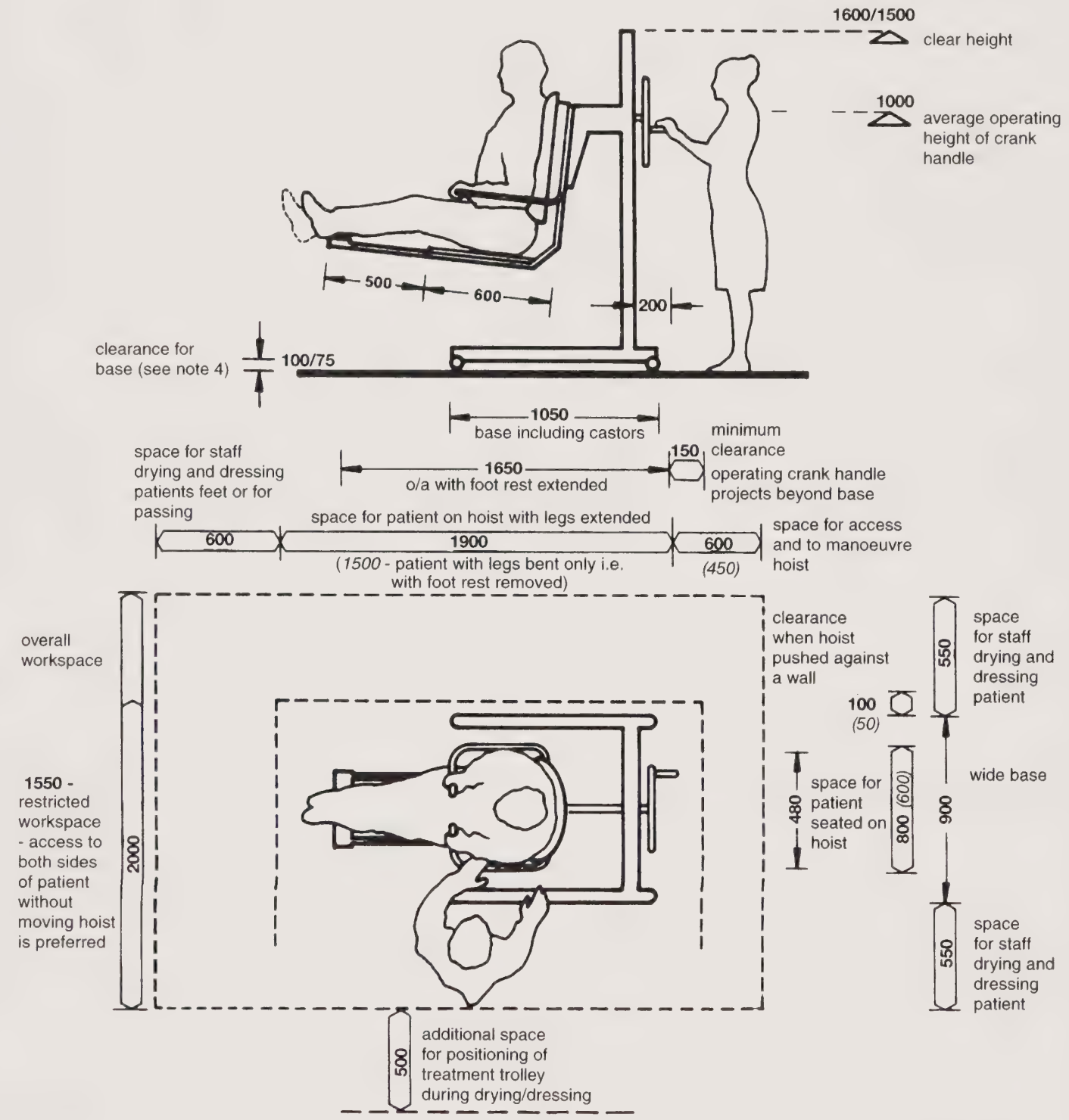
Activities:
Drying and dressing patient on hoist.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Patient Hoist 4

With chair attachment drying and dressing patient

Users:
1 staff (moving hoist)



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. A wide based hoist should be used since it is more stable.

2. The larger the castors the easier the hoist is to manoeuvre.

3. Approximate rated lifting capacity: 160 Kg

4. Lifting range varies from model to model, between 500 and 1000 maximum.

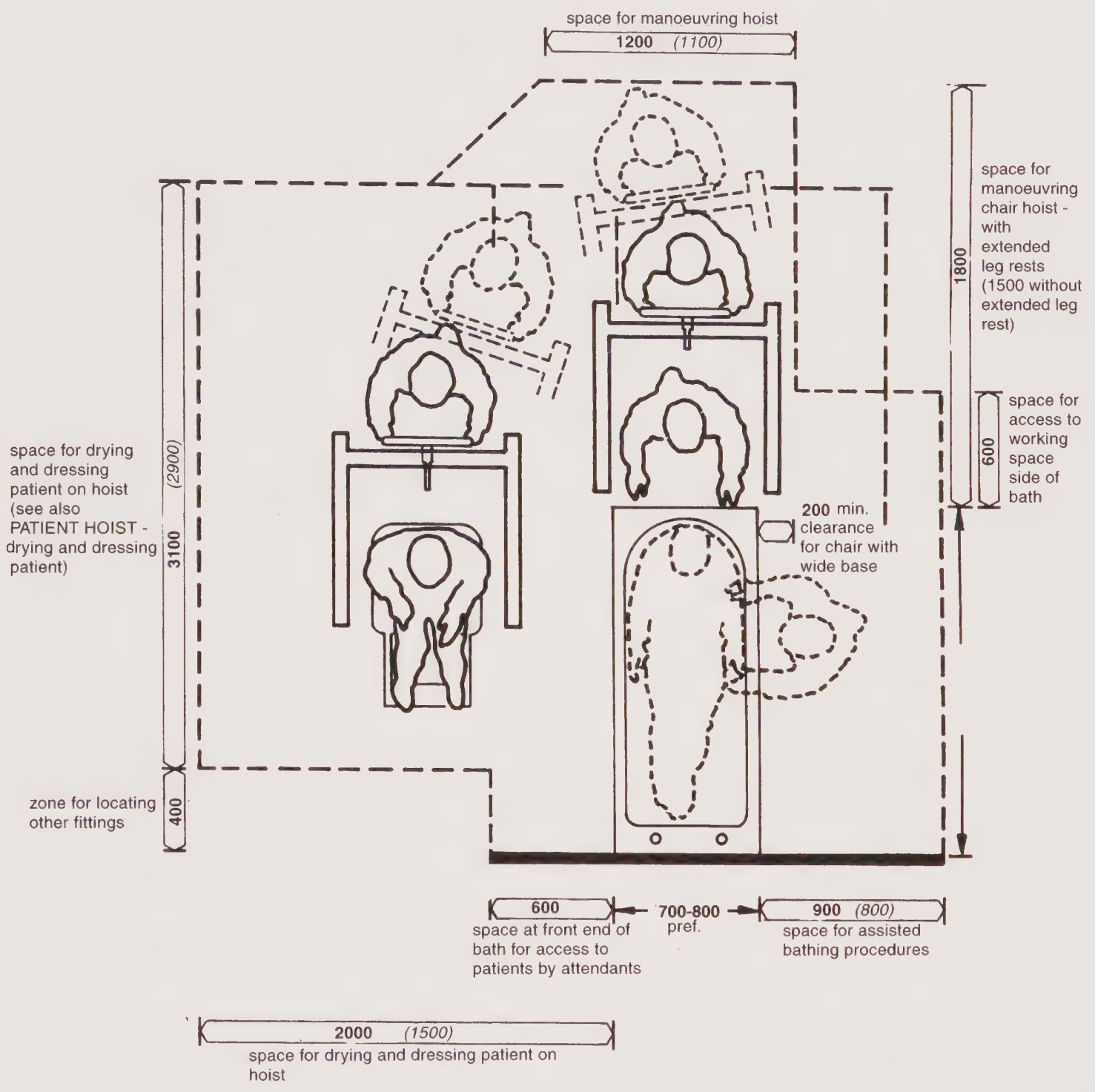
Activities:
Manoeuvring patient into and out of bath (access from end of bath).

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Patient Hoist 5

Mobile chair hoist, manoeuvring into and out of bath

Users:
2 or more staff and patient


space for manoeuvring hoist
1200 (1100)
space for manoeuvring chair hoist - with extended leg rests (1500 without extended leg rest)
1800
space for access to working space side of bath
600
space for drying and dressing patient on hoist (see also PATIENT HOIST - drying and dressing patient)
3100 (2900)
200 min. clearance for chair with wide base
zone for locating other fittings
400
600
space at front end of bath for access to patients by attendants
700-800 pref.
900 (800)
space for assisted bathing procedures
2000 (1500)
space for drying and dressing patient on hoist

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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6.4 Toilets

(Notes to ergonomic data sheets)

General points

1. The space/spaces required vary depending upon the range of users and components to be accommodated. The space allowed for activities should take into account the varying degrees of assistance that may be required, and the fact that some users may be relatively inexperienced at manoeuvring a wheelchair or using any other aid to mobility.

2. Disabled users of the building (whether patients, visitors or staff) should not have to travel further, or make more effort than other users, to use a toilet. Consideration should be given as to whether the overall toilet provision is adequate for the needs of particular ethnic groups if it is likely that there will be a significant number of users from any such group.

3. Accessible toilet facilities must be reached along fully accessible routes, and clearly indicated (see data sheets for 'Corridors' and 'Signposting' earlier in this volume).

4. Toilet facilities should not be located within lobby areas if at all possible, since their doors and confined spaces can be difficult for people with problems of mobility and hand function, also for those who use wheelchairs, to negotiate. However, privacy should always be maintained; toilet doors should therefore not open directly off busy circulation spaces, or the layout should be such that the open door does not give a view of the interior of the toilet. In assisted WCs, where this is not possible, a curtain should be provided to ensure that the patient using the toilet cannot be seen from the adjacent corridor or activity space.

5. Toilet facilities for wheelchair users can be provided either on a "unisex" or "integral" basis. A "unisex" facility is approached separately from other sanitary accommodation; it has practical advantages in that it is more easily identified, it permits assistance by a companion of either sex, and it can be used by others who require more space (such as those with a pushchair, child or guide dog). It is less demanding of space than an "integral" toilet facility, which effectively has to be duplicated in order to achieve the same level of provision for both sexes. (An "integral" facility is contained within each of the separate provisions for male and female users, and thus precludes assistance from a companion of the opposite sex.)

6. Whether toilet compartments for wheelchair users are designed on a "unisex" or "integral" basis, they should be similar in layout and content, and should satisfy the following needs: to achieve necessary wheelchair manoeuvre; to allow for frontal, lateral, diagonal and backward transfer onto (and off) the toilet; to provide facilities for handwashing and hand drying within reach of the toilet, prior to transfer back onto the wheelchair; and to have sufficient space to allow a helper to assist in the transfer. Where more than one type of toilet is made available, it is suggested that mirrored unisex facilities would best meet the needs of individual preferences.

7. All fittings (toilet, basin, etc.) should be securely fixed, since people may need to lean on them or grip them for support.

Toilet

8. The shape of the toilet pan and bowl is important. Many wheelchair users and ambulant disabled people need to cleanse themselves while still sitting on the toilet, so it is useful if the pan offers a wide opening, and the water level should not be less than 200 mm from the rim. The toilet pan should be made of tough material, the pan fixing must be strong, and effective seat stabilisers are important. It is especially important to avoid any sharp edges and rough surfaces.

9. Some users will only be able to use one hand, so the toilet-paper dispenser must be within easy reach and should dispense individual sheets – or otherwise incorporate a locking device which allows sheets to be easily torn off with one hand.

10. Provision of a toilet lid will prevent use of the horizontal rail behind the pan.

11. A black or dark toilet seat should be fitted to a white ceramic WC unit, thus providing good colour contrast and helping the intended user to locate the facility.

Basin

12. The basin and soap dispenser should be positioned so that they can be reached while sitting on the toilet, and should be contrasted in colour and tone with the surface to which they are fixed. This will assist the visually-impaired, and will allow hands and other parts of the body to be washed before transferring back onto the wheelchair (thus avoiding the possibility of staining clothes or the wheelchair.)

13. Handrinse facilities vary from 350 mm to 450 mm in size. Basins which project for less than 300 mm tend to be very unsatisfactory in that they do not adequately contain splashing, whereas basins over 350 mm deep require an excessive sideways reach from the WC seat to acccess taps etc. Recessed basins are generally not favoured because they tend to be too shallow and restrict access for – and movement of hands by – some disabled users.

14. To facilitate good access to the basin, the centre line of the bowl should not be forward of the front edge of the WC seat. Where the taps are positioned on the far side of the basin, the preferred location of the basin is set back between 200 mm and 250 mm from the front edge of the WC.

15. The towel dispenser must be within easy reach, to allow users to dry themselves.

16. Fittings such as toilet flush and taps should be equipped with lever handles, since these do not require the ability to grip and can even be operated using an elbow.

Bins

17. Some people may wear bags which need to be emptied into the toilet, or they may wear disposable colostomy/ileostomy bags or incontinence pads. A suitable sealed bin should be provided for the disposal of these; this must be positioned within easy reach of the toilet and where it does not obstruct circulation space.

18. A bin will also be required if paper towels are provided; paper or cloth towels (which do not require strength to pull) are preferred to hand dryers, which have limited application for people with disabilities.

Rails

19. Rails are used to provide support and stability when transferring, sitting down and standing up, and while adjusting clothing. The hinged fold-down rail is used in combination with a fixed wall rail by relatively independent users to provide support when lowering themselves onto the seat. Vertical rails are used for pulling back up to a standing up position, and they are also important for a male standing up to urinate when sticks and crutches have been discarded. (See the 'grabrails' data sheet earlier in this Volume.)

20. Grabrails must be positioned symmetrically over the toilet, and should be contrasting in colour and tone with the surface to which they are fixed. The 700 mm dimension allows access to the toilet by patients on wheeled sanitary chairs; this dimension must not be exceeded, since it will significantly reduce the effectiveness of the handrails as an aid to users.

Help call facility

21. An alarm cord, reachable from the toilet/basin area and the floor, must be fitted; it should be differentiated, both in colour/tone and diameter, from the light pull cord.

Floor and wall surfaces

22. Good lighting and colour contrasting between floors and walls, and also between fixtures, walls and fittings such as toilet seats, enable those with impaired sight to use the facilities more easily and safely.

23. The floor must be non-slip, even when wet.

Doors

24. The leading edge of the door should be in the middle of the room, not the corner. The door should open out, but if inward opening is unavoidable the room depth must be increased to clear the door swing. It must be possible to open the door outwards in an emergency.

Minimum requirements

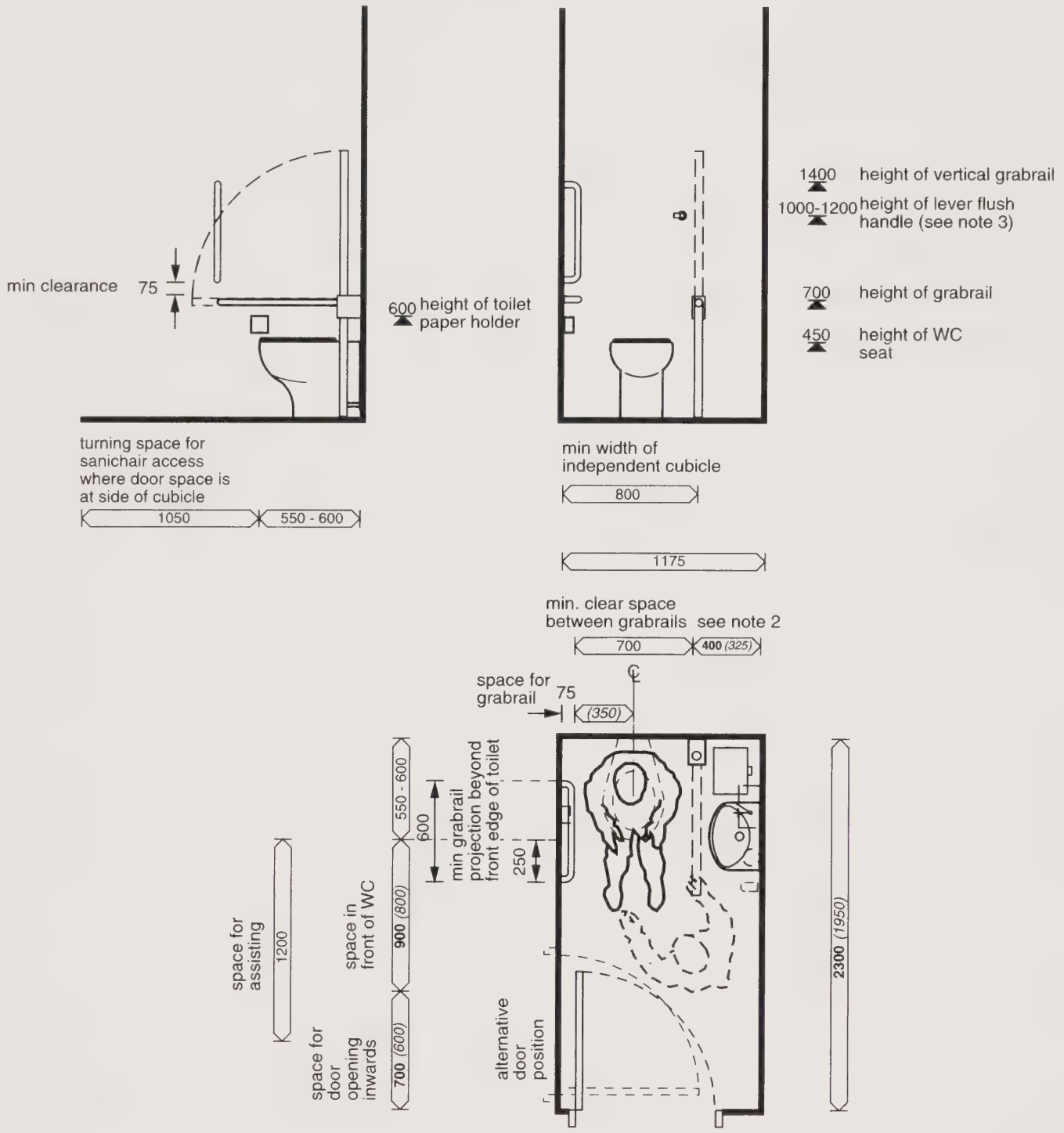
25. Compliance with Building Regulations 1991 in England and Wales is by designing to the minimum standards in Approved Document M. Compliance with the Building Standards (Scotland) Regulations 1990 is by meeting the requirements of Part T of the Technical Standards, which requires compliance with BS5810: 1979.

Activities:
Use of WC and handrinse facilities with front access space for assistant.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Toilets 2

Users:
Ambulant, semi-ambulant, assisted or independent, (also sanitary chair users)



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. This layout allows space for entry with a child or bags etc. Where several unisex or ambulant WCs are provided they should be handed.

2. When the hinged grabrail is in the raised position, a dimension of 600 (rather than 400 (325)) allows side access for assistant.

3. Flush handles below 1100 will obstruct positioning of a sanitary chair over the WC.

4. Floors should be slip resistant and in contrasting colour to the walls and WC. Floors should not be shiny or cause reflections or glare since this causes confusion for people with sight impairments. The colour or tone of the background should allow grabrails and sanitary fittings to be easily distinguished.

5. An alarm cord, reachable from the toilet/ basin and floor must be fitted.

6. Where assistance is minimal, the cubicle width can be reduced to 1100.

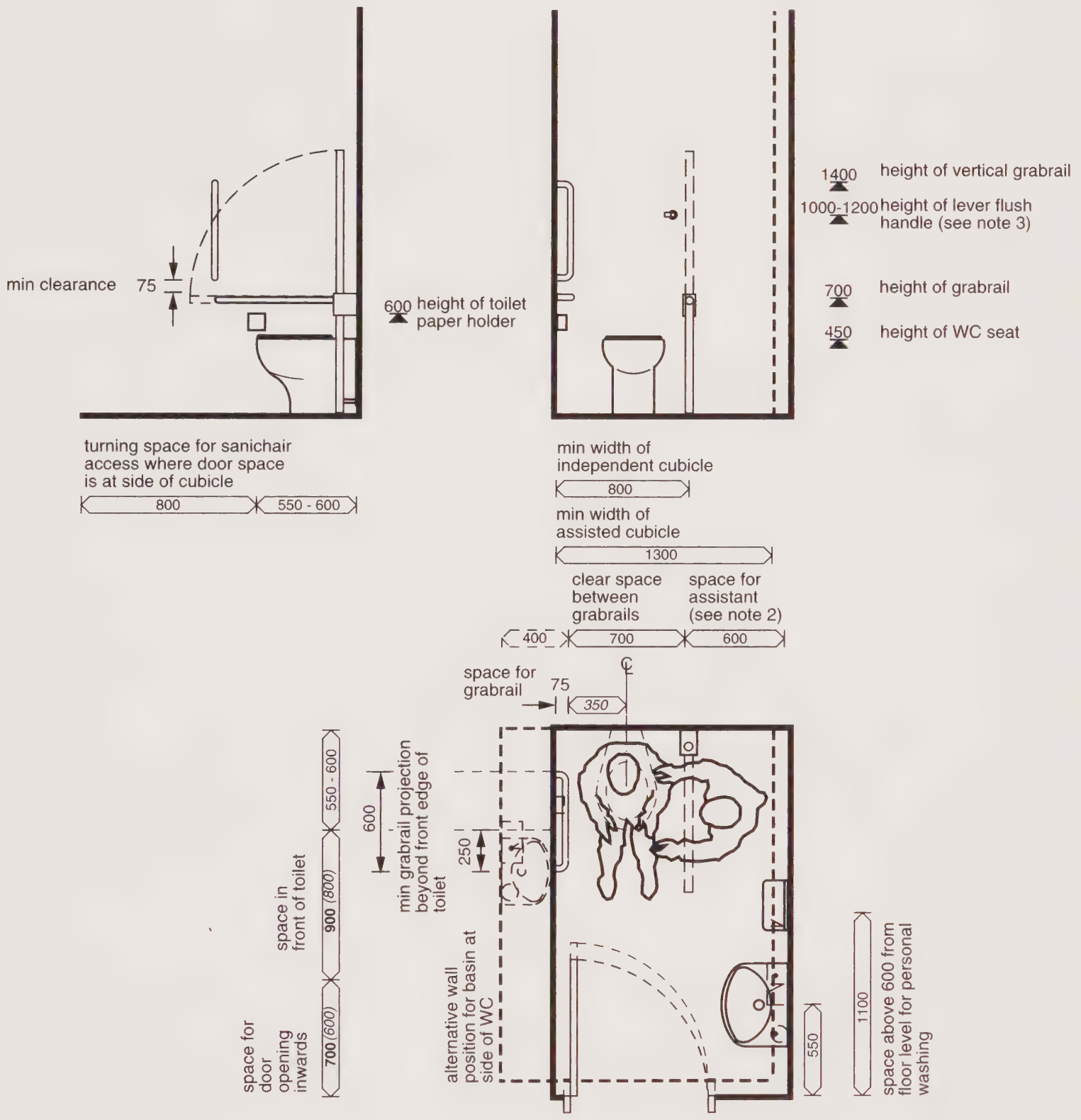
7. Side access to the WC for the assistant is generally preferred for semi-ambulant people. See Toilets 3.

Activities:
Use of WC and handrinse facilities with side access space for assistant.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Toilets 3

Users:
Ambulant, semi-ambulant, assisted or independent, (also sanitary chair users)



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

© Crown Copyright

1. This layout allows space for entry with a child or bags etc. Where several unisex or ambulant WCs are provided they should be handed.

2. This allows side access when the hinged grabrail is in the raised position.

3. Flush handles below 1100 will obstruct positioning of a sanitary chair over the WC.

4. Floors should be slip resistant and in contrasting colour to the walls and WC. Floors should not be shiny or cause reflections or glare since this causes confusion for people with sight impairments. The colour or tone of the background should allow grabrails and sanitary fittings to be easily distinguished.

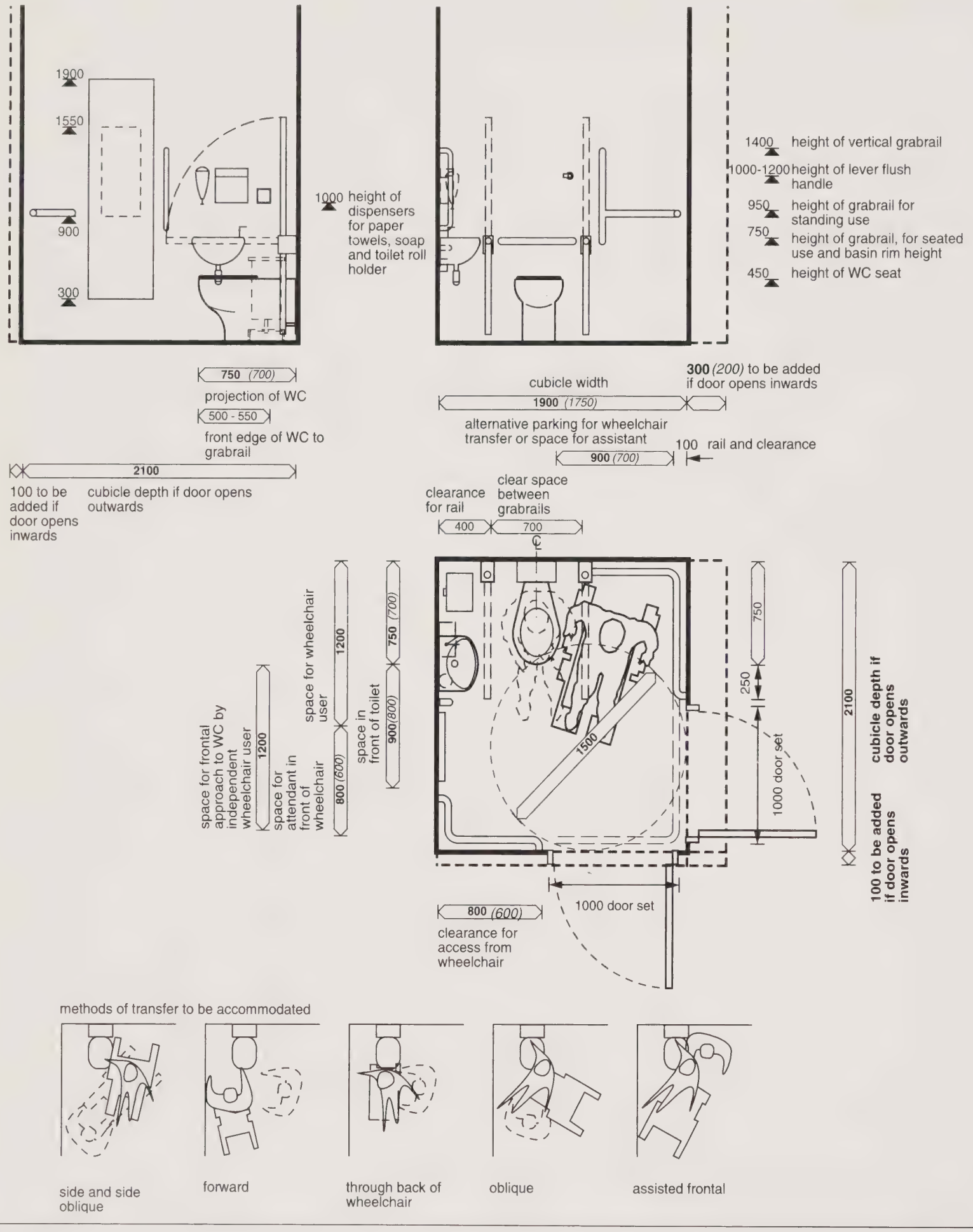
5. An alarm cord, reachable from the toilet/ basin and floor must be fitted.

Activities:
Use of WC and handrinse facilities for wheelchair users and semi-ambulant people. Toilet can also be used as a specimen WC.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Toilets 4

Users:
Independent wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

a. See notes for Toilets 4, 5 and 6 on separate page.

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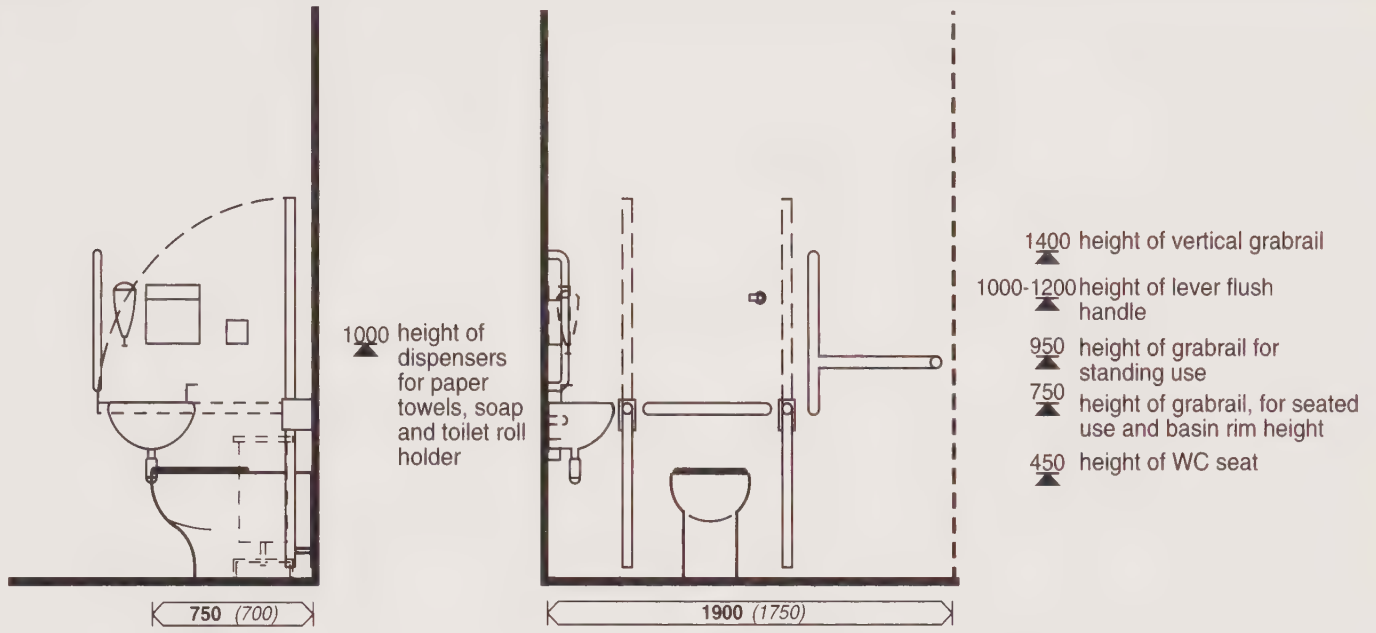
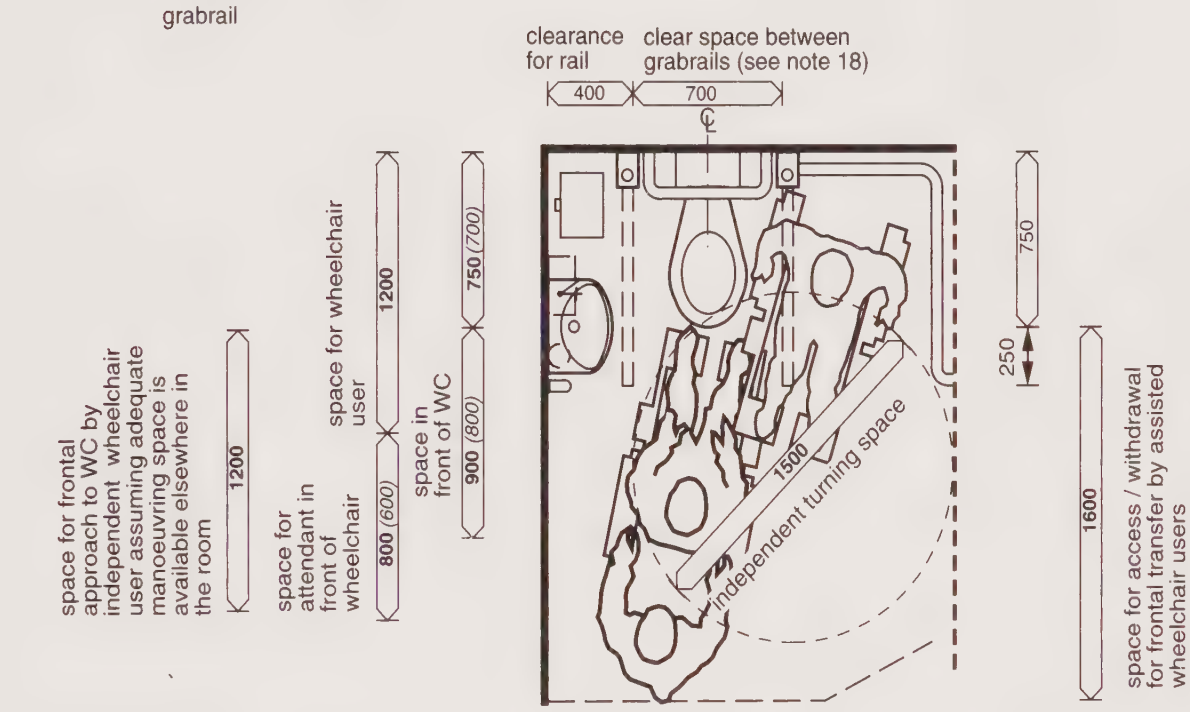
Activities:
Use of WC and handrinse facilities for wheelchair users and semi-ambulant people

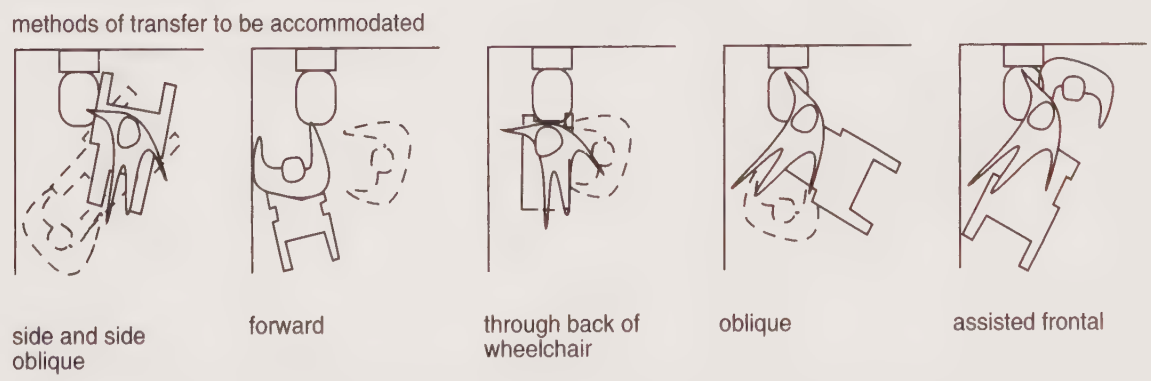
NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Toilets 5

Users:
Independent and assisted wheelchair users


1000 height of dispensers for paper towels, soap and toilet roll holder
1400 height of vertical grabrail
1000-1200 height of lever flush handle
950 height of grabrail for standing use
750 height of grabrail, for seated use and basin rim height
450 height of WC seat
750 (700)
projection of WC
500 - 550
front edge of WC to grabrail
1900 (1750)
space at side of WC for sideways or side oblique transfer by independent wheelchair users or space for assistant
900 (800)





Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

a. See notes for Toilets 4, 5 and 6 on separate page.

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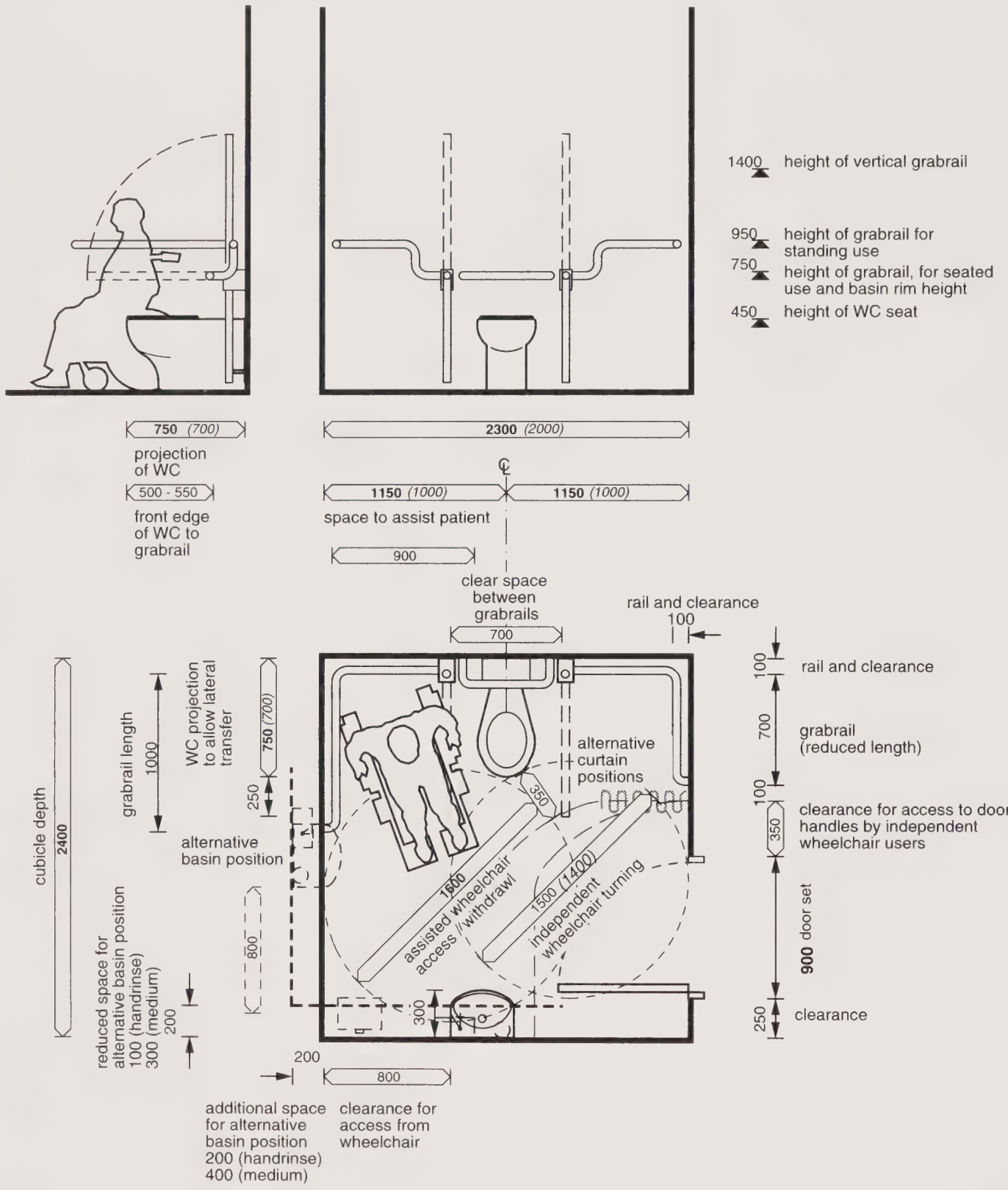
Activities:
Use of WC and handrinse facilities. Providing for lateral transfer from right or left to/from a wheelchair and allowing for full assistance by two persons standing either side of WC.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Toilets 6

Users:
Independent and dual assisted wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

a. See notes for Toilets 4, 5 and 6 on separate page.

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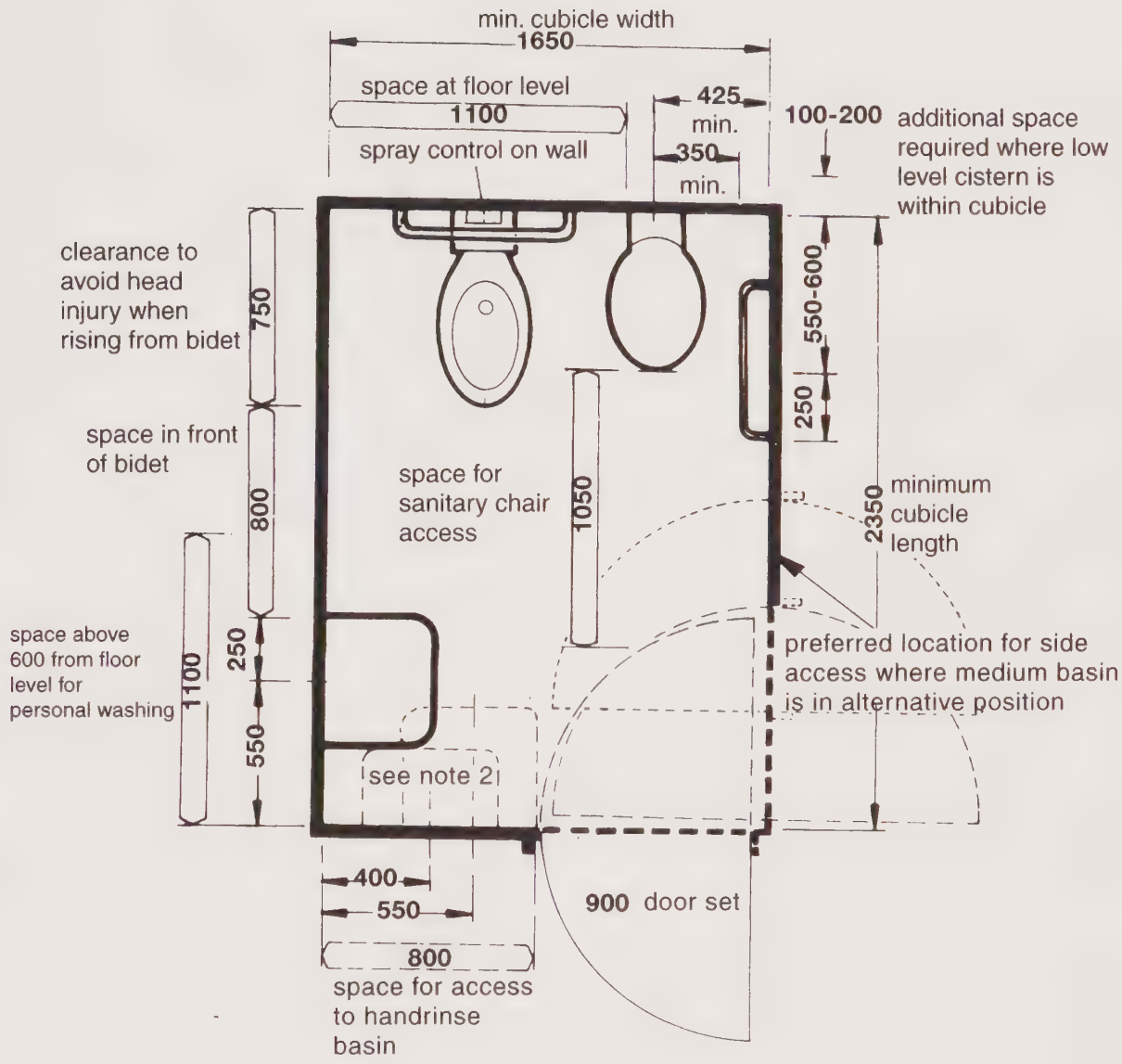
Activities:
Use of WC and bidet (where assistance is minimal) and sanitary chair access.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Toilets 7

WC with bidet and basin

Users:
Fully ambulant and semi-ambulant users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

© Crown Copyright

1. Where practicable doors should open outwards to give access to an occupied cubicle in an emergency.

2. Alternative position for hand rinse basin only (for medium basin where less satisfactory 800 door set is used) - when basins are in this position, cubicle length may be reduced to 2100 (medium basin) 1950 (handrinse basin).

6.5 Bathrooms

Definition

Bathroom – Ambulant patient

1. An activity space with facilities for an ambulant patient, who may require minimal assistance, to have a bath.

Bathroom – Assisted patient

2. An activity space with facilities for a patient who may be ambulant, possibly using walking aids, in a wheelchair or on a mobile hoist, needing the help of staff in bathing.

General points

3. A WC is often used before or after bathing, particularly in certain medical and surgical circumstances, and one should be provided in all bathrooms, as well as a hand-wash basin. Reference should be made to the Toilet data sheets for further details.

4. It is important to ensure that the bathroom temperature is warm enough to meet all patients' needs (21° – 22°C).

5. Adequate ventilation is essential to avoid a build-up of heat and humidity which can create an uncomfortable environment for patients and staff.

6. Spillages of water and talcum powder etc. are inevitable and the floor surface should be slip-resistant.

7. The patient/nurse call system should be easily identifiable and located so that it can be operated by the patient lying in the bath.

8. It may be necessary to consider whether provision is adequate for the special needs of particular ethnic groups if it is likely that there will be a number of patients from such groups.

9. The bottom of the bath must be non-slip.

10. The decor, fixtures and fittings should be in contrasting colours/tone to aid visually impaired people to see where one surface ends and another begins.

11. Bathrooms should not be used for the storage of hoists, weighing chairs, sani-chairs etc since these detract from the homely appearance of the bathroom and require staff to be frequently moving equipment which can contribute to back pain and strains. Adequate storage space for these items should be provided elsewhere.

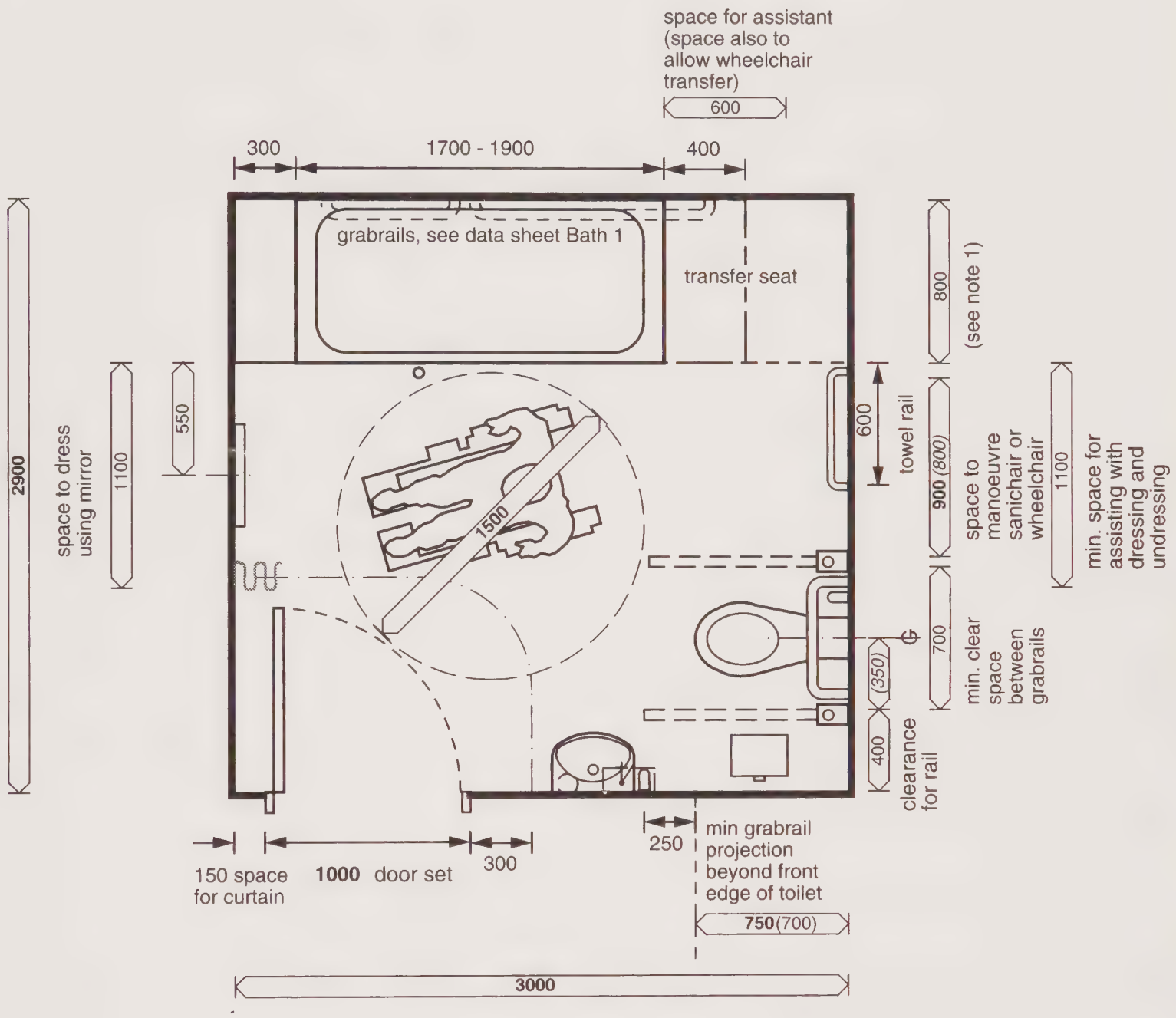
Activities:
Facilities for patients who may require some assistance to have a bath, use WC or wash basin.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Bathroom 1,

With WC and personal washing facilities

Users:
Fully ambulant, semi-ambulant and independent wheelchair patients



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. An 800 wide bath is preferred, as a 700 bath is restrictive for larger adults.

2. A fixed height bath with a rim height of 475 should suit most, though not all, users.

3 . A fixed height bath should have a transfer area at the end opposite the taps. This allows a person to slide across from a chair or wheelchair and transfer down into the bath from a sitting position.

4. Grabrails are required to facilitate the bather transferring into and out of the bath. For a bath which abuts onto a wall these need to be at a height and angle to facilitate this.

5. People who are elderly or incapacitated tend to manoeuvre onto their knees before standing up in the bath, the width of the bath and the height and angle of the grabrails needs to reflect this. See grabrail data sheet.

6. The bottom of the bath must be non-slip.

7. Suitably located shelves are required for the storage of treatment and bath preparations and clothing.

8. Patients may sit at the basin to have their hair shampooed, thus there needs to be space for a patient to sit at the basin and for staff to manoeuvre around and open the door without knocking into the patient.

9. A soap dispenser is required fixed just above the basin.

10. A mirror is required placed above the basin.

11. A shelf is required at the side of the basin, at basin height, on which to put wash bags, a change of clothes, etc.

12. A towel rail is required close to the basin.

13. To maintain the privacy of patients when in the bath, it is desirable that access doors be screened and that these should not impede access by assisting staff.

Bathroom 2, assisted

(Notes to ergonomic data sheets)

1. Assisted bathrooms should have adequate space for staff to carry out the tasks of assisting the patient to wash and bathe efficiently and safely.

2. The position of the door is important to facilitate easy entry with a hoist or wheelchair.

3. There should be adequate floor space to manoeuvre a hoist to and around the toilet, the basin and the bath.

4. It is strongly recommended that a variable height bath is provided. This can be lowered to allow more independent patients to get in and out themselves with minimal assistance and can be raised to assist staff bathing less able patients. Alternatively a bath with a built-in seat which can be raised, lowered and rotated out of the bath could be provided.

5. The bath and the hoists should be compatible.

6. The bottom of the bath must be non-slip.

7. Suitably located shelves are required for the storage of treatment and bath preparations and clothing.

8. Patients may sit at the basin to have their hair shampooed, thus there needs to be space for a patient to sit at the basin and for staff to manoeuvre around and open the door without knocking into the patient.

9. A soap dispenser is required fixed just above the basin.

10. A mirror is required placed above the basin.

11. A shelf is required at the side of the basin, at basin height, on which to put wash bags, a change of clothes, etc.

12. A towel rail is required close to the basin.

13. Adequate space should be allowed at the side of the toilet to enable staff to assist the patient.

14. A shelf should be provided above the toilet on which to store glove wipes and cream.

15. The toilet paper should be within easy reach of the person on the toilet.

16. The basin should be within easy reach of the patient on the toilet in case they are wheelchair users who may wish to wash their hands before transferring back to the wheelchair.

Activities:
Facilities for bathing, drying and dressing patient, including use of patient hoist and assisted WC and basin.

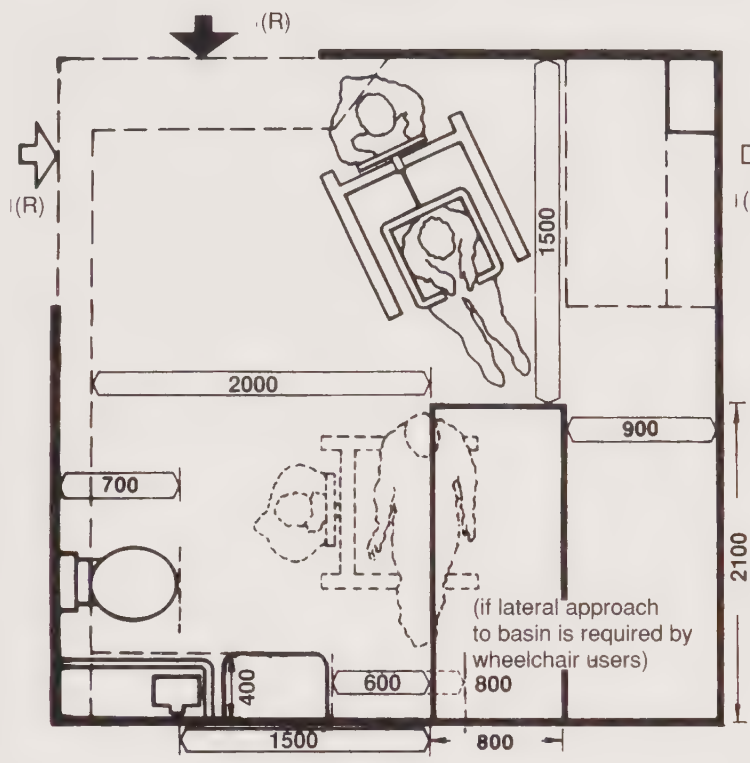
NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Bathroom 2,

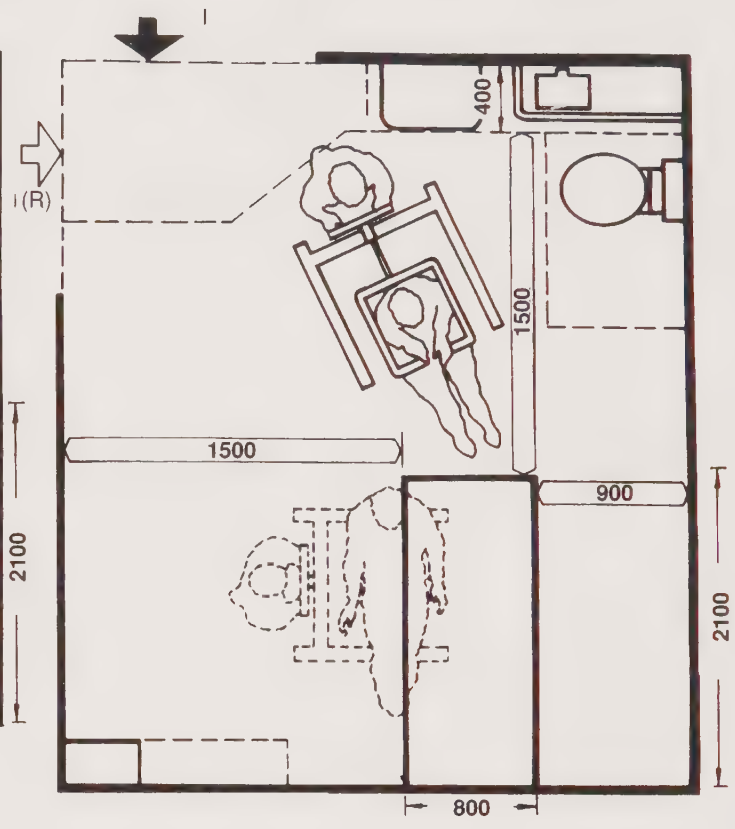
Assisted with WC and personal washing facility

Users:
Semi-ambulant

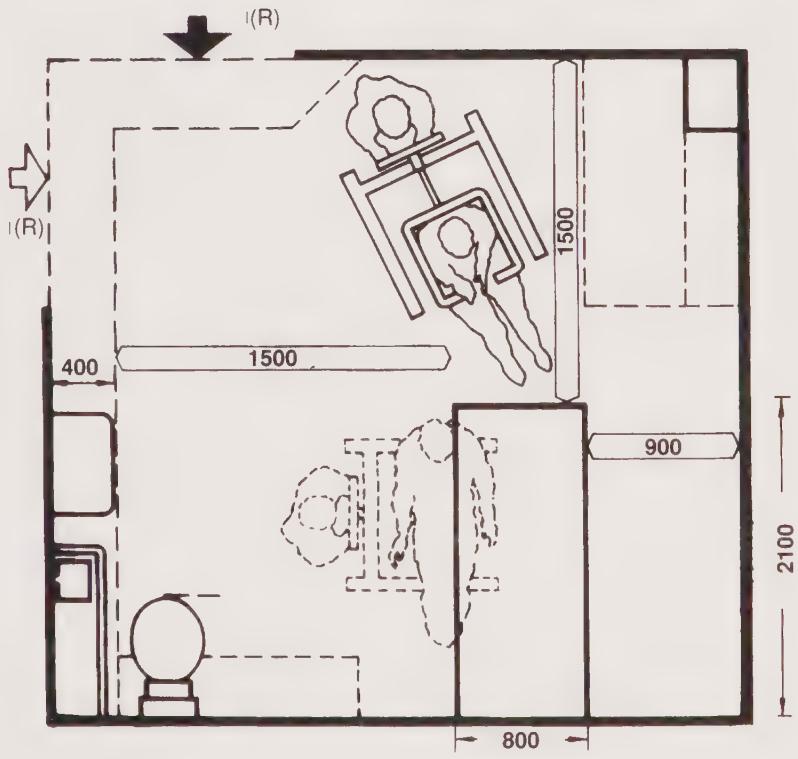
Plan A



Plan B



Plan C



NOTES
See also Door screen arrangements data sheet

Key

= preferred position of access door(s)

= alternative position of access door(s)

= Inward opening doors

I(R) = Inward opening doors (recessed) (all 1500 door sets)

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

1. See notes Bathroom 2, on separate page.

2. See also Door screens data sheets.

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6.6 Showers

Definition

Shower – ambulant/semi – ambulant patient

1. An activity space with facilities for an ambulant patient, who may require minimal assistance, to shower and use a washbasin.

Shower – assisted patient

2. An activity space with facilities for a patient, who may be in a wheelchair or sanitary chair, needing the help of staff to shower and use a wash basin from a seated position. This facility will also be suitable for independent wheelchair users.

Shower – fully ambulant (staff)

3. An activity space with facilities for staff to shower. See Volume 3 for data sheet.

General points

4. Showers in health buildings should be designed to meet the needs of patients and particular attention should be paid to the problems of access, mobility, physical stability and generally reduced activity and strength.

5. Access to and movement within the wet and dry areas of the cubicle should enable staff to assist in showering the patient safely and effectively whilst remaining dry themselves. Hand held and adjustable height shower heads are essential and should be provided. Fixed overhead showers are inappropriate.

6. Showers should be supplied with blended water via a thermostatic mixing valve under user control. The valve should be pre-set and locked to limit the maximum temperature of blended water delivered at the spray, although a lower flow temperature will be available at the user's choice. The controls should be accessible to staff from the dry area.

7. The patient/nurse call system should be located just within the wet area, adjacent to the shower control. The cord should be provided to skirting level, to be within reach of a patient who may have fallen or collapsed.

8. The floor surface throughout should be slip resistant, and the gradient of the wet area to the waste outlet should be 1:60. The waste outlet must be effective in discharging water to prevent ponding.

9. There should be a continuous grabrail round the wet area wall.

10. In the dry area, coat hooks and towel rails should be within reach of the patient using the seat.

11. It is important to ensure that the cubicle temperature is warm enough to meet all patients' needs (21° – 22°) and ventilation must be sufficient to avoid a build-up of heat and humidity. The extract should not be located directly above the user.

12. Ideally, a WC should be provided within the shower cubicle.

13. It should be possible for staff to gain easy access to an occupied cubicle in an emergency. It should therefore be possible to open outwards doors which normally open inwards.

14. Shower controls should be sited close to or outside the shower curtain and the shower head should be removable so that staff do not get wet when showering patients.

15. The decor, fixtures and fittings should be in contrasting colours/tone to aid visually impaired people to see where one surface ends and another begins.

16. Shower rooms should not be used for the storage of hoists, weighing chairs, sani-chairs etc since these detract from the homely appearance of the bathroom and require staff to be frequently moving equipment which can contribute to back pain and strains.

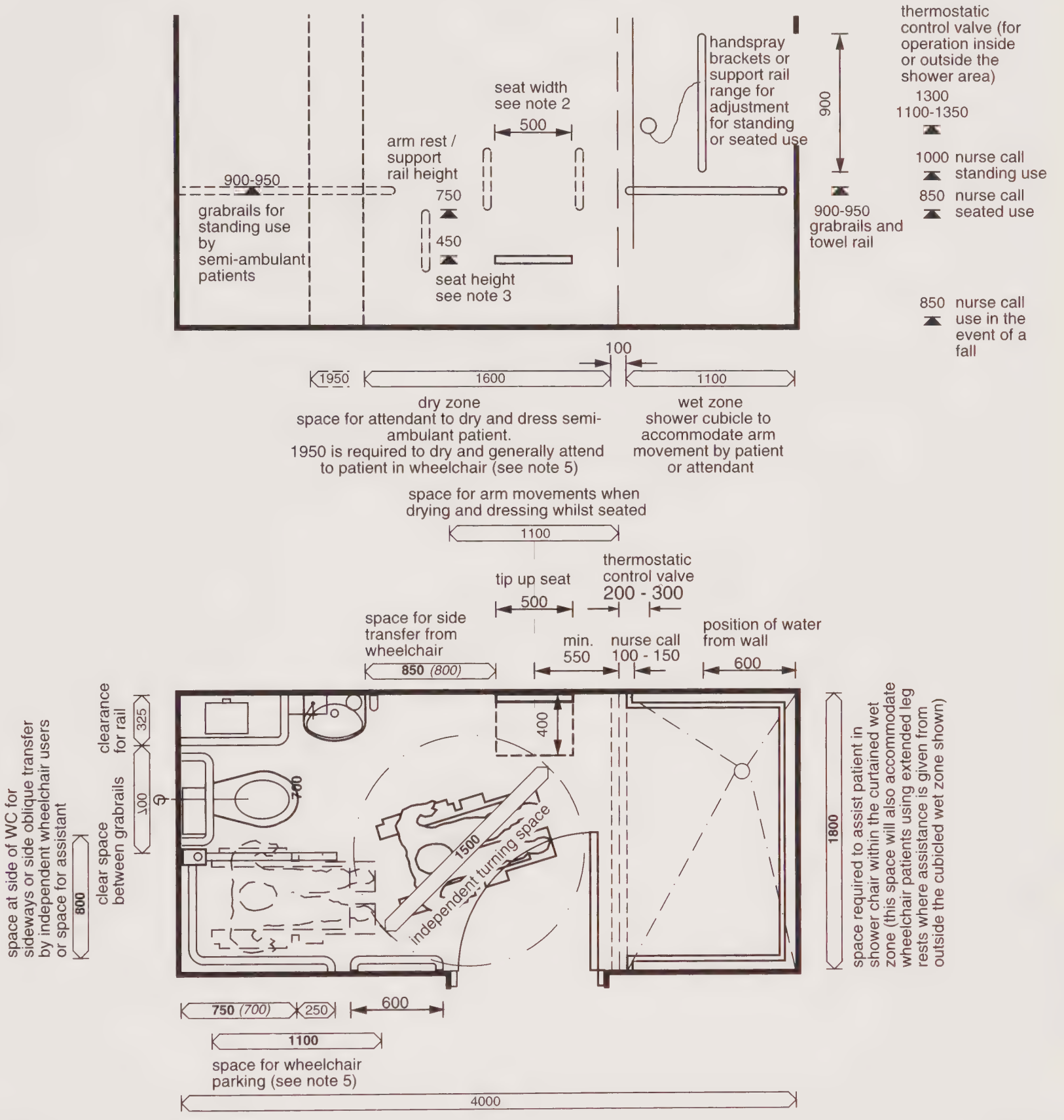
17. Adequate storage space for these items should be provided elsewhere.

Activities:
Facilities for patients, who require assistance, to shower and use WC and wash basin

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Shower 1,
with WC and wash basin

Users:
Semi-ambulant users with assistance and wheelchair users


handspray brackets or support rail range for adjustment for standing or seated use
900
thermostatic control valve (for operation inside or outside the shower area)
1300
1100-1350
1000 nurse call standing use
850 nurse call seated use
850 nurse call use in the event of a fall
seat width see note 2
500
arm rest / support rail height
900-950
750
450
grabrails for standing use by semi-ambulant patients
seat height see note 3
900-950 grabrails and towel rail
100
1950
1600
1100
dry zone
space for attendant to dry and dress semi-ambulant patient.
1950 is required to dry and generally attend to patient in wheelchair (see note 5)
wet zone
shower cubicle to accommodate arm movement by patient or attendant
space for arm movements when drying and dressing whilst seated
1100
tip up seat
500
thermostatic control valve
200 - 300
space for side transfer from wheelchair
850 (800)
min. 550
nurse call 100 - 150
position of water from wall
600
400
clearance for rail
325
clear space between grabrails
100
700
space at side of WC for sideways or side oblique transfer by independent wheelchair users or space for assistant
800
1500
independent turning space
1800
space required to assist patient in shower chair within the curtained wet zone (this space will also accommodate wheelchair patients using extended leg rests where assistance is given from outside the cubicled wet zone shown)
750 (700)
250
600
1100
space for wheelchair parking (see note 5)
4000

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. The flexible hose outlet should be positioned so as not to impede clear access to the control valve.

2. Seated patients should preferably have support rails (tip-up type) usable from tip-up seat. The rails / rests should be 300 above the supporting seat height.

3. A higher seat height of 500 is preferred where the facility is frequently used by wheelchair patients who normally use 50mm (or deeper) seat cushions.

4. The position of the user space for drying / dressing (dry zone) can be varied in relation to the shower cubicle (wet zone) provided that the individual activity requirements (patient transfer, wheelchair turning, drying and dressing) are fully maintained.

5. Where the space allowed for drying / dressing is the minimum recommended (i.e. 1600 x 1500), and no provision is made for a WC with associated space, additional space should be provided either inside the cubicle or conveniently outside the room to park the transporting wheelchair.

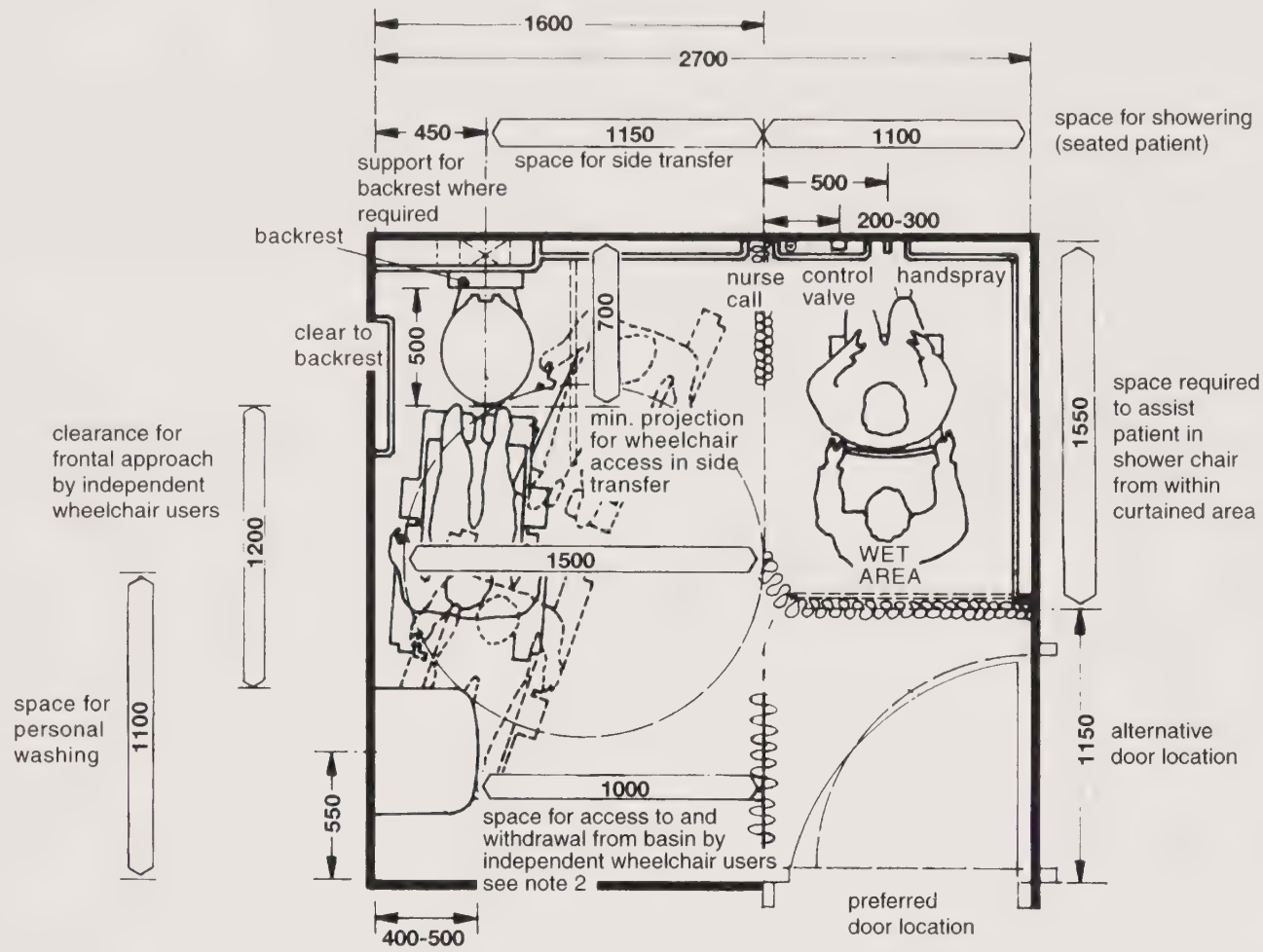
6. It is preferable that whenever possible and accessible a continuous handrail support system surrounding the ambulant user areas be available to semi-ambulant patients. This will not always be possible, i.e. immediately behind the tip-up seat where a grabrail would impede use of the seat.

Activities:
Facilities for patients who require assistance, who may require the use of a wheelchair or sanitary chair, to shower, use WC and wash basin.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Shower 2,
with WC, and wash basin

Users:
Semi-ambulant users with assistance and wheelchair users



ALTERNATIVE LAYOUT

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. To safeguard the privacy of patients when changing or using the shower, it is desirable that access doors be adequately screened and that these should not impede access or egress by assisting staff.

2. A space of 1200 is preferable to accommodate assisted wheelchair manoeuvres in front of basin.

3. The nurse call should be operable at 900 - 1000 above floor level (seated use) and at 50 -100 above floor level for patients who have fallen.

4. Inward opening doors (in unscreened positions) are possible but cannot be recommended as wheelchair movement becomes restricted, also door swing may be obstructed by patient using the basin or WC preventing entry by staff. Therefore, if an inward opening door is proposed it must be possible to open it outwards in an emergency.

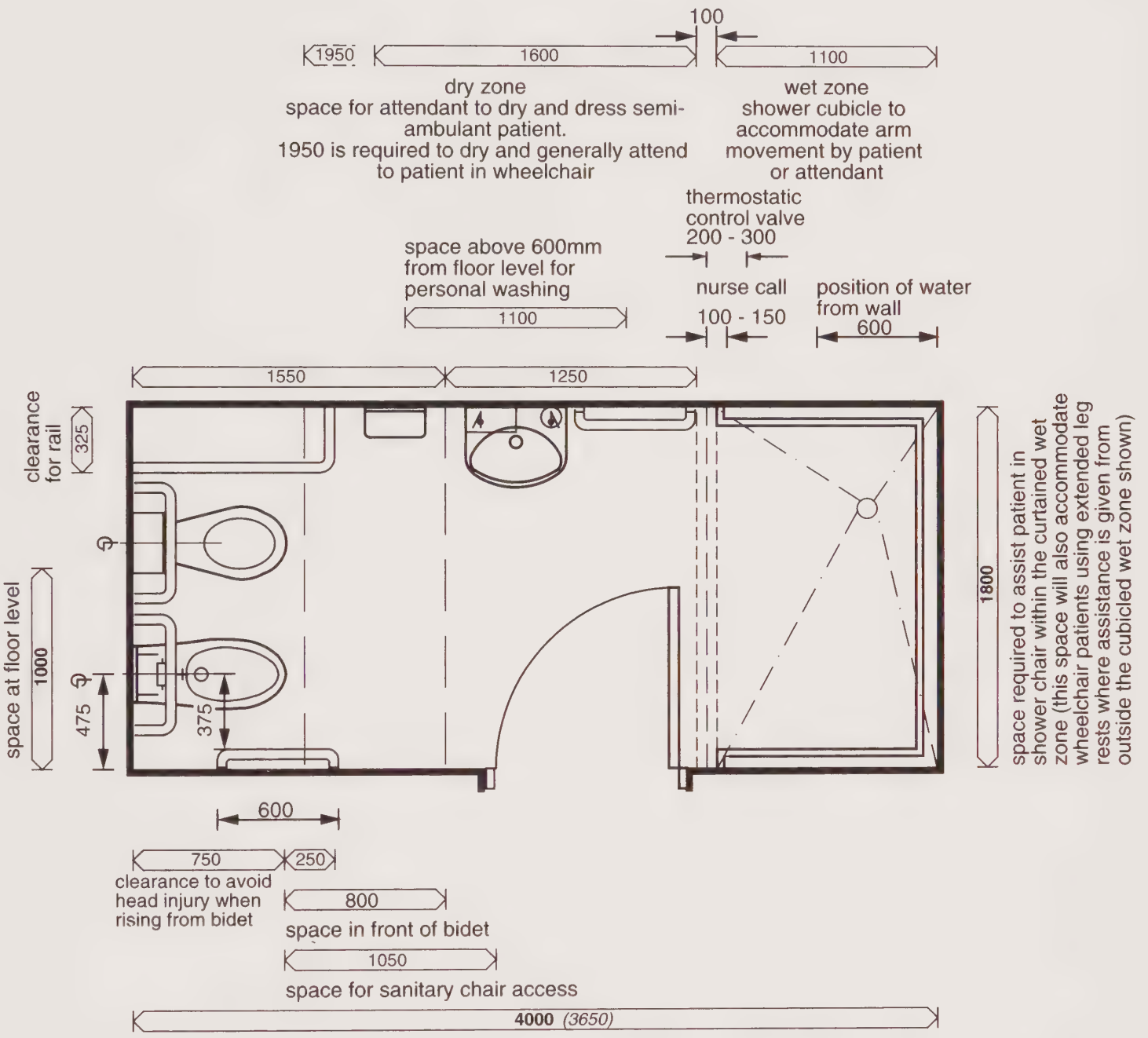
Activities:
Facilities for patients who require assistance, who may require the use of a wheelchair, sanitary chair or hoist, to shower, use WC, bidet and wash basin

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Shower 3,

WC/ Shower / Bidet

Users:
Semi-ambulant users with assistance and wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

1. The nurse call should be operable at 900 - 1000 above floor level (seated use) and at 50 -100 above floor level for patients who have fallen.

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6.7 Components

This section contains a selection of component-user data sheets relating to commonly occurring components. The data sheets give dimensional and other ergonomic information about the use of individual components.

Activities:
Doctor interviewing patient with escort. Space required around desk for sitting, circulation and parking of equipment.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

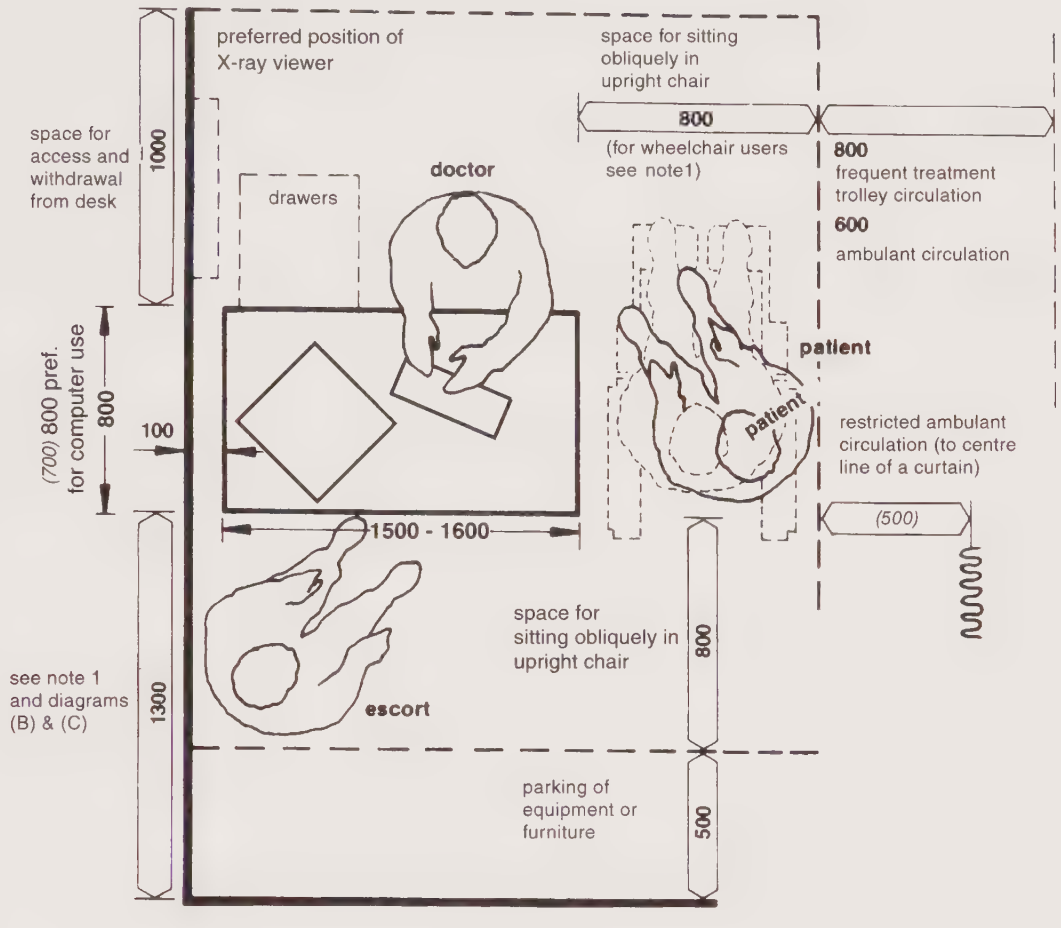
Desk 1

Doctor's with drawer on one side

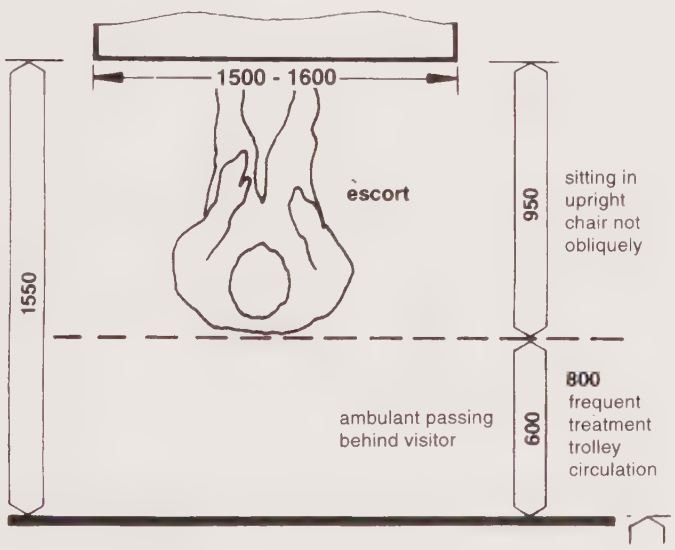
Users:

Doctor, patient (ambulant or in wheelchair) with escort

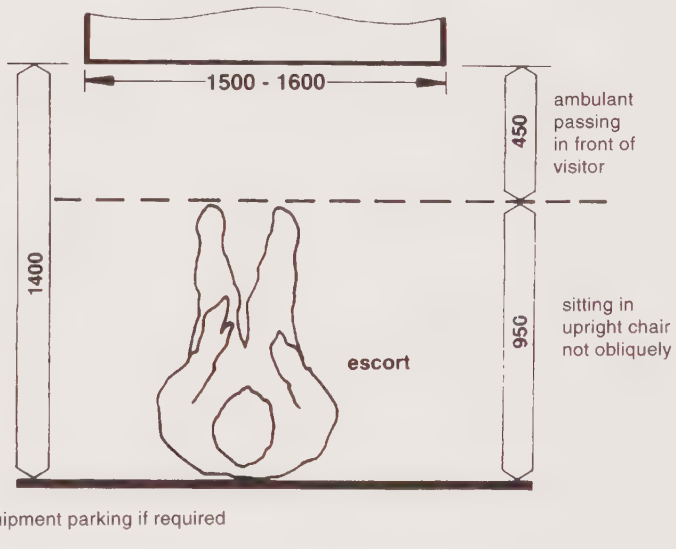
(A) SPACE REQUIREMENTS AROUND DOCTORS DESK



(B) SPACE IN FRONT OF DESK TO ALLOW PASSING BEHIND A SEATED VISITOR (e.g. to gain access to an adjoining examination or other room)



(C) SPACE IN FRONT OF DESK TO ALLOW PASSING IN FRONT OF A SEATED VISITOR (e.g. to gain access to an adjoining examination or other room)



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Access by independent or assisted wheelchair users should also be considered. Space requirements for manoeuvring depend on door positions and room layout. A clear turning space of 1500 diameter is desirable.

2. The window must not be positioned behind the doctor's desk since this can put the doctor's face in shadow, thus making it difficult for those with hearing impairments to lip read and adding to the difficulty of those with sight impairments.

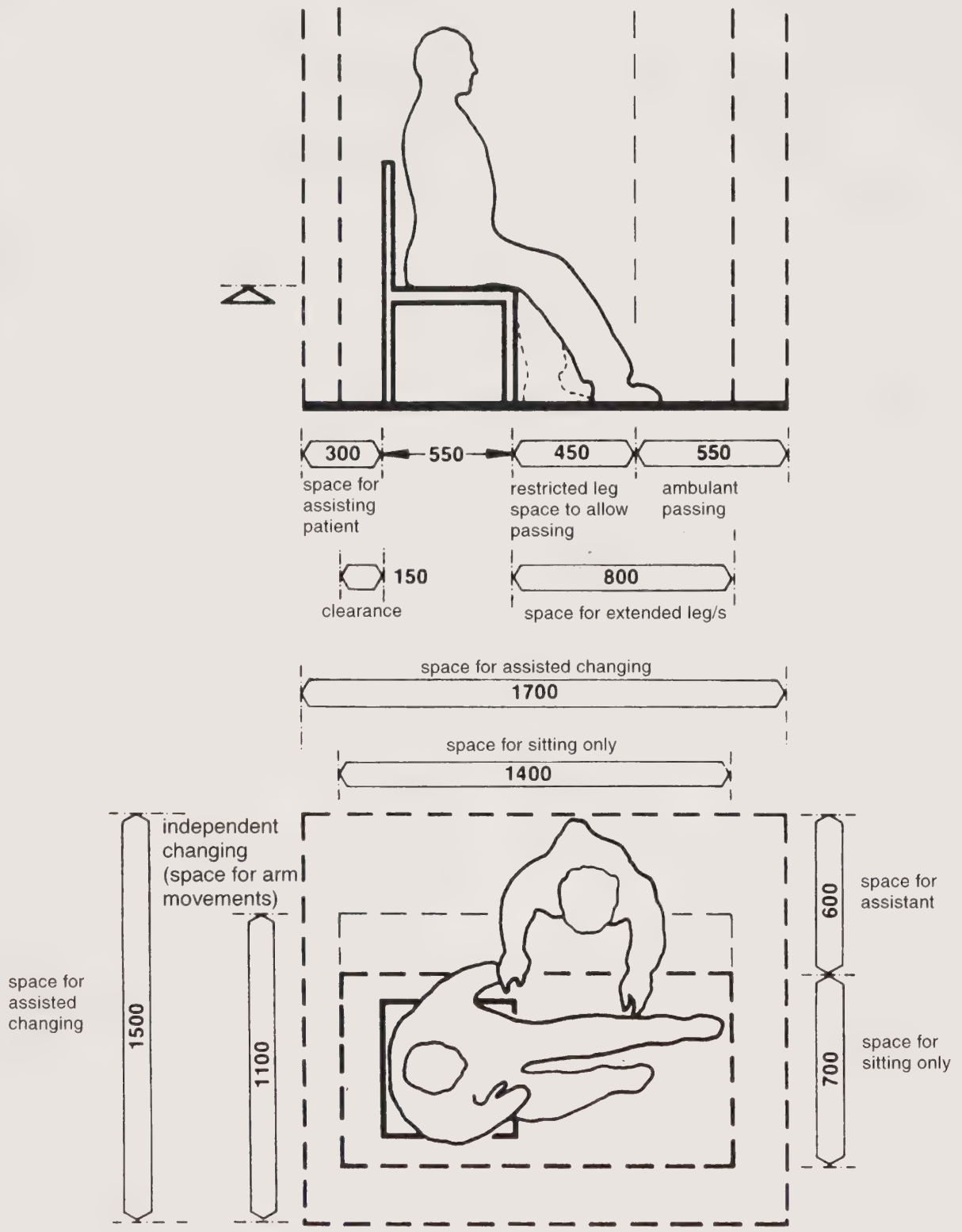
Activities:
Assisted and independent changing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Chair 3

Upright

Users:
Semi-ambulant (including the elderly), with assistance



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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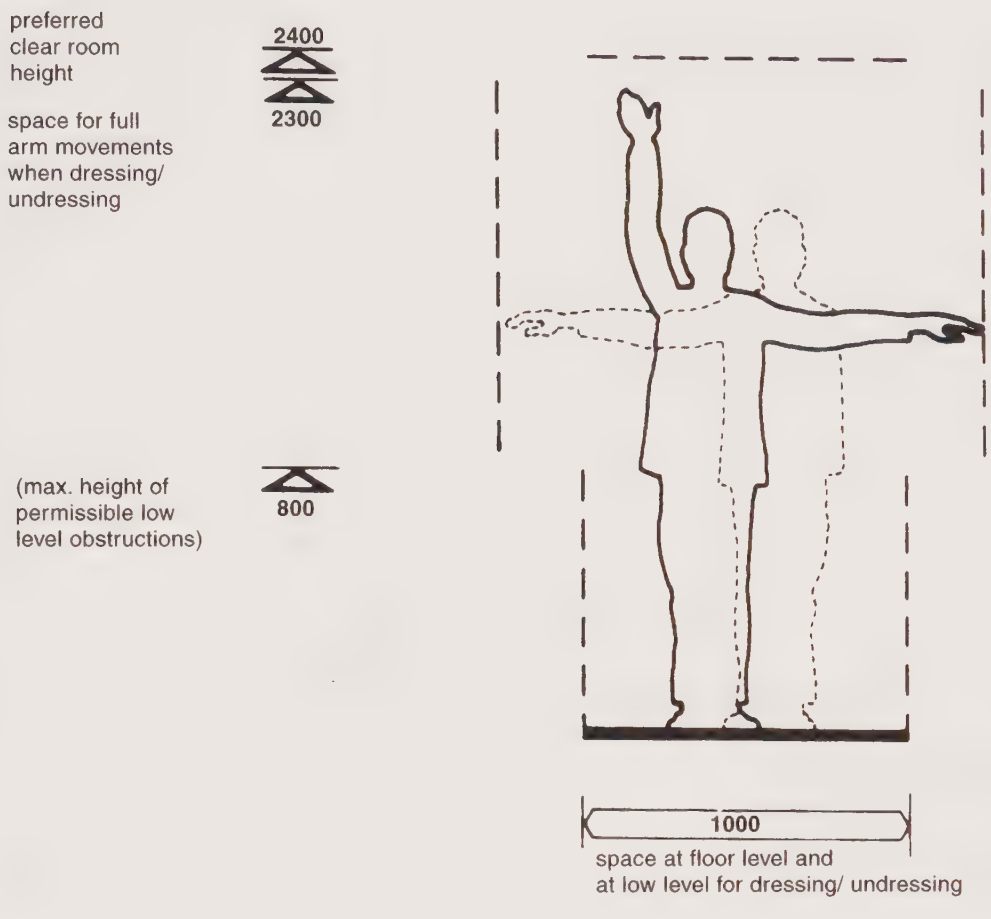
Activities:
Dressing / undressing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Person 8

Users:
Fully ambulant adult without assistance


preferred clear room height
2400
2300
space for full arm movements when dressing/ undressing
(max. height of permissible low level obstructions)
800
1000
space at floor level and at low level for dressing/ undressing
1500
space for arm movement when dressing/undressing
space for arm movements when dressing/undressing
1200
space at floor level and at low level for dressing/undressing
1000

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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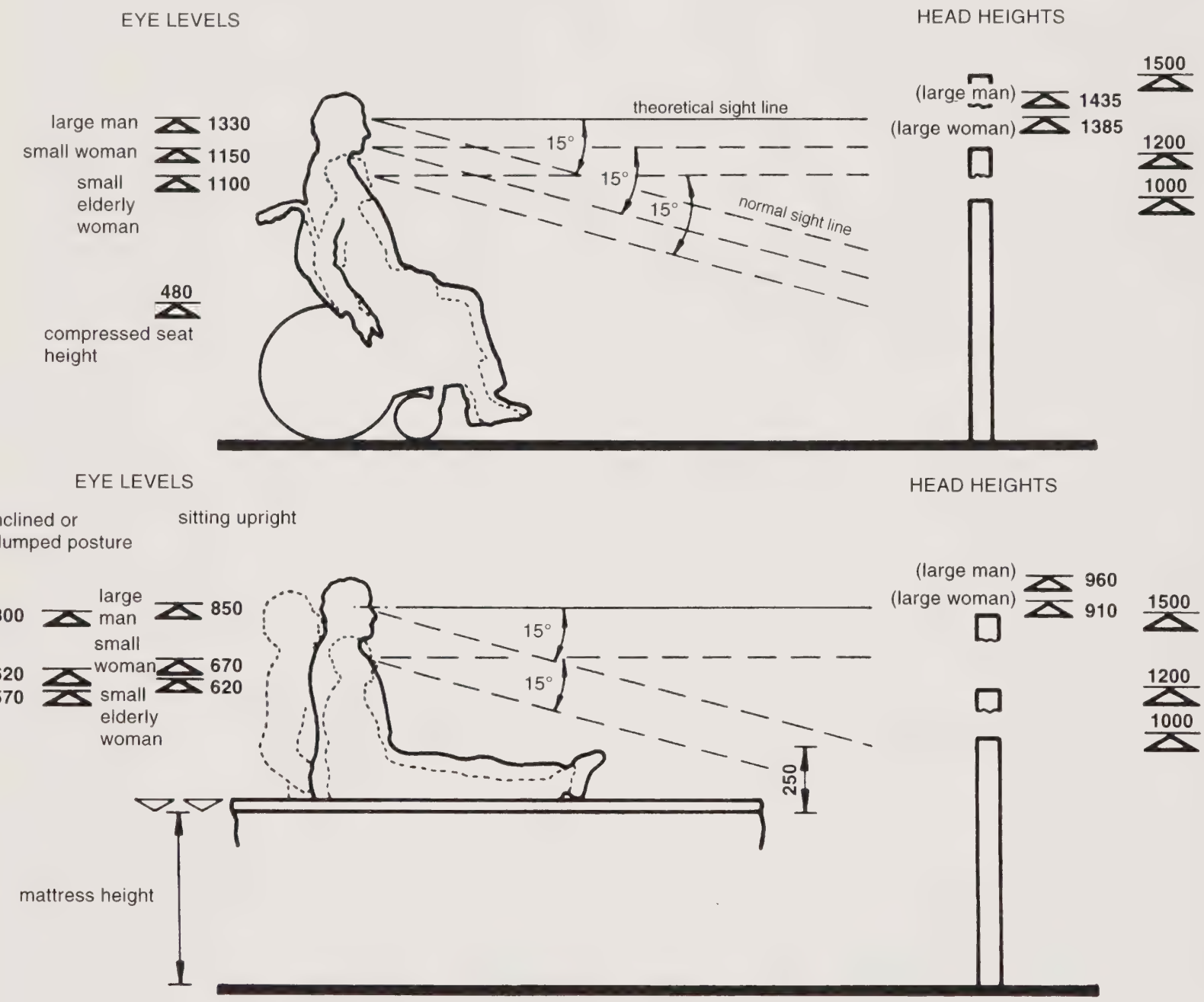
Activities:
Sitting in wheelchair or up in bed.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Low partition 1

Office/ bed privacy screen

Users:
Wheelchair users, patients in bed



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

Bed Type	King's Fund (Fixed Height)	King's Fund (Variable Height)	Fixed Height (Hospital)	Divan Type
Platform Height	610	410-840	480	350
Mattress Thickness	125	125	125	125
Mattress Compressed Thickness	75	75	75	75

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Switches and socket-outlets

(Notes to ergonomic data sheets)

General

1. Switches and socket-outlets must be accessible and easy to use. These include: light switches, electrical sockets and controls for heating, air conditioning and ventilation and equipment. Regulation of equipment should be operable by all, control systems should be at an accessible height, be in an accessible location and also be of a suitable design to be operated by all, including those with reduced hand function and sight impairments. They should be operable with one hand only and not require pinch grips, tight grasping or twisting of the wrist.

Types of switch

2. Rocker switches are easier to operate by persons with finger or hand impairment providing wide rockers are selected. Toggle switches may be preferred to rocker switches for those situations where it is desirable to discern easily whether the switch is "on" or "off", but the toggles should be of a type which are long in length and light to operate. Switches controlling fixed appliances (other than lighting) should, in the event, incorporate an "on/off" light.

3. It is easier for people to discern between on and off when using toggle switches rather than rocker switches but the latter are easier to use by anyone with hand function difficulties. Therefore it is better to use a rocker switch with an indicator light in preference to a toggle switch for example on electric sockets and light controls.

4. Controls and switches must be large enough to provide a gripping surface sufficient to operate them. Tactile identification should be provided for visually impaired people. Large rocker switches and push pads can be operated by those with severe hand or wrist impairments as they can be operated with the whole hand or elbow, but rotating switches should be avoided.

5. Switches should be up when off and down when on.

Spacing of switches

6. Switches for use by disabled people should be well spaced – preferably 85 mm minimum centre to centre, therefore multi-gang switches should be avoided. Where wiring regulations or functional requirements dictate the provision of ceiling mounted switches, pull cords should be provided with operating dollies, having preferred minimum width or diameter of 45 mm.

Socket-outlets

7. All socket-outlets for use by disabled persons should be switched. Adequate provision is important to avoid the need to use adapters, which can be dangerous. Double socket-outlets with the switches located between the sockets will be difficult for some disabled persons to operate correctly and therefore preferably should be avoided. Double socket-outlets with switches located at the outer edges are more suitable but the choice of manufacturers who can currently supply these is very restricted. An alternative for situations which functionally require adjacent socket-outlets for use by disabled persons is to provide single gang accessories mounted on dual boxes.

8. Hooks adjacent to sockets for plugs not currently in use are advantageous to reduce the need to bend down to reach plugs when required, which may be impossible for those with mobility impairments.

Accessibility

9. There should be a clear floor space large enough to enable a person with a mobility impairment, including people in wheelchairs to manoeuvre and access the switches and sockets. A space of 760 x 1220 mm is recommended in front of any switches or controls to allow either a forward or parallel approach by a person using a wheelchair.

10. Radiator controls should be placed at the top of the radiator, not the base, for easy access.

Height of switches/socket-outlets

11. Controls and switches should be located at a height which can be reached by short people, those in wheelchairs and children, with the exception of those controls which operate items which would be hazardous to children. This requirement is also applicable to controls and switches located above obstructions. If the controls can be approached sideways the maximum height of the controls should be 1400 mm and the lowest 230 mm above the floor. Electrical systems should be placed no lower than 300 mm from the floor. Electrical sockets should be placed at a maximum of 1200 mm and a minimum of 300 mm from the floor and 500 mm from the corners of rooms. Light switches should be at the same height as a door handle, the recommended height is 1040 from the floor (minimum 800 mm and maximum 1200 mm).

12. Other switches and controls should be placed in the range of 800–1200 mm from the floor.

13. Controls, sockets and switches above obstructions which are 800 mm – 900 mm high and 500 – 600 mm wide should be a maximum of 1200 mm from the floor and be a minimum of 250 mm clear of the obstruction.

14. Minimum heights of low sockets should be applied where trailing flexes would be hazardous.

Plugs

15. Plugs could have handles incorporated into them to enable those with poor grip to insert and remove them more easily.

Lighting

16. Controls and switches should be located in a position where they can be well illuminated. A recommended illumination level is 100 lux at the surface of the controls/ switches.

17. Light switches, plugs, etc should be in a contrasting colour to their surroundings to enable those with visual impairments to be able to see them.

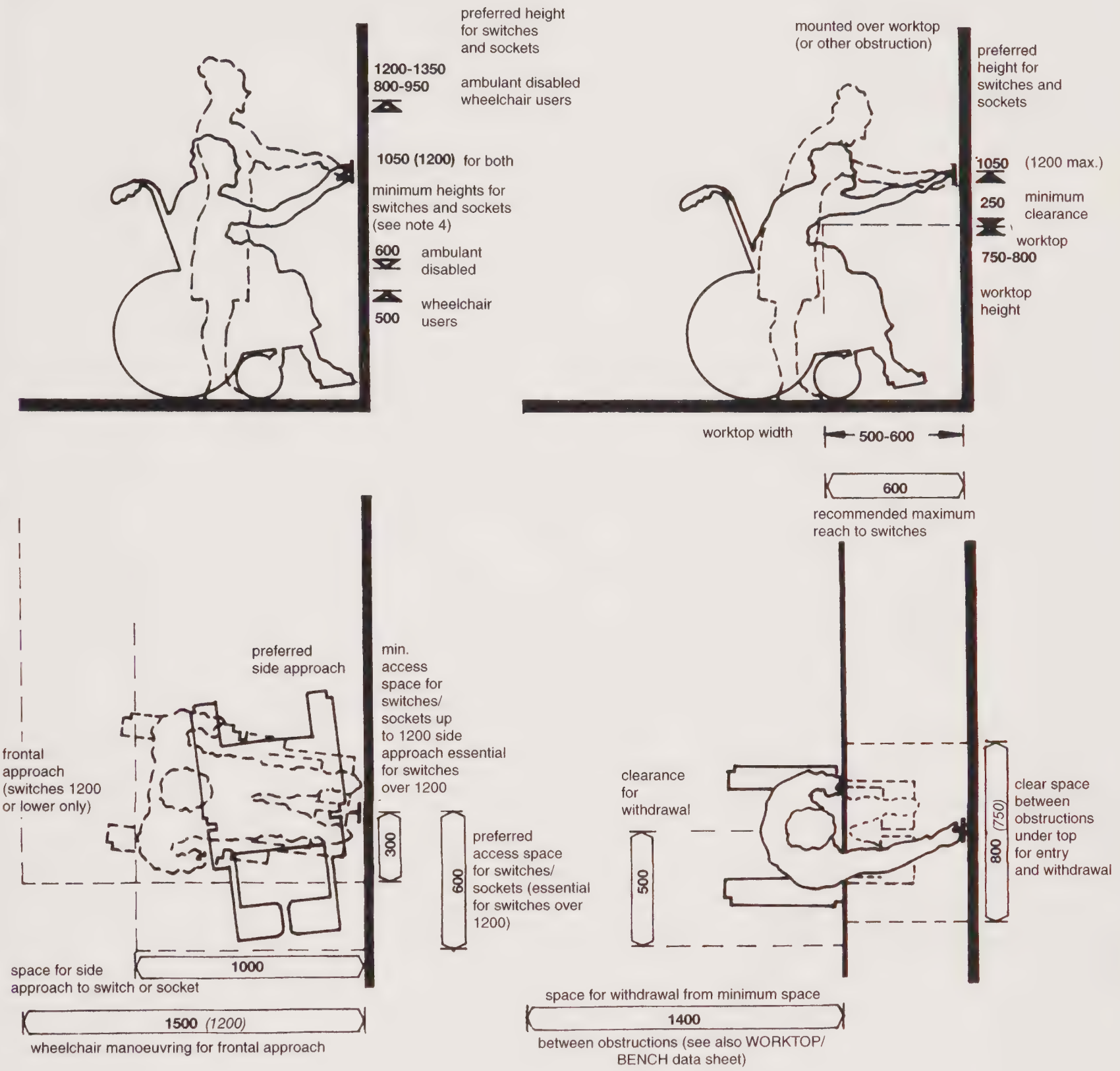
Activities:
Use of switches. Use of sockets, inserting and removing plugs.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Switches & sockets 1

wall mounted

Users:
Fully ambulant, mobility impaired and wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

a. See notes on opposite page

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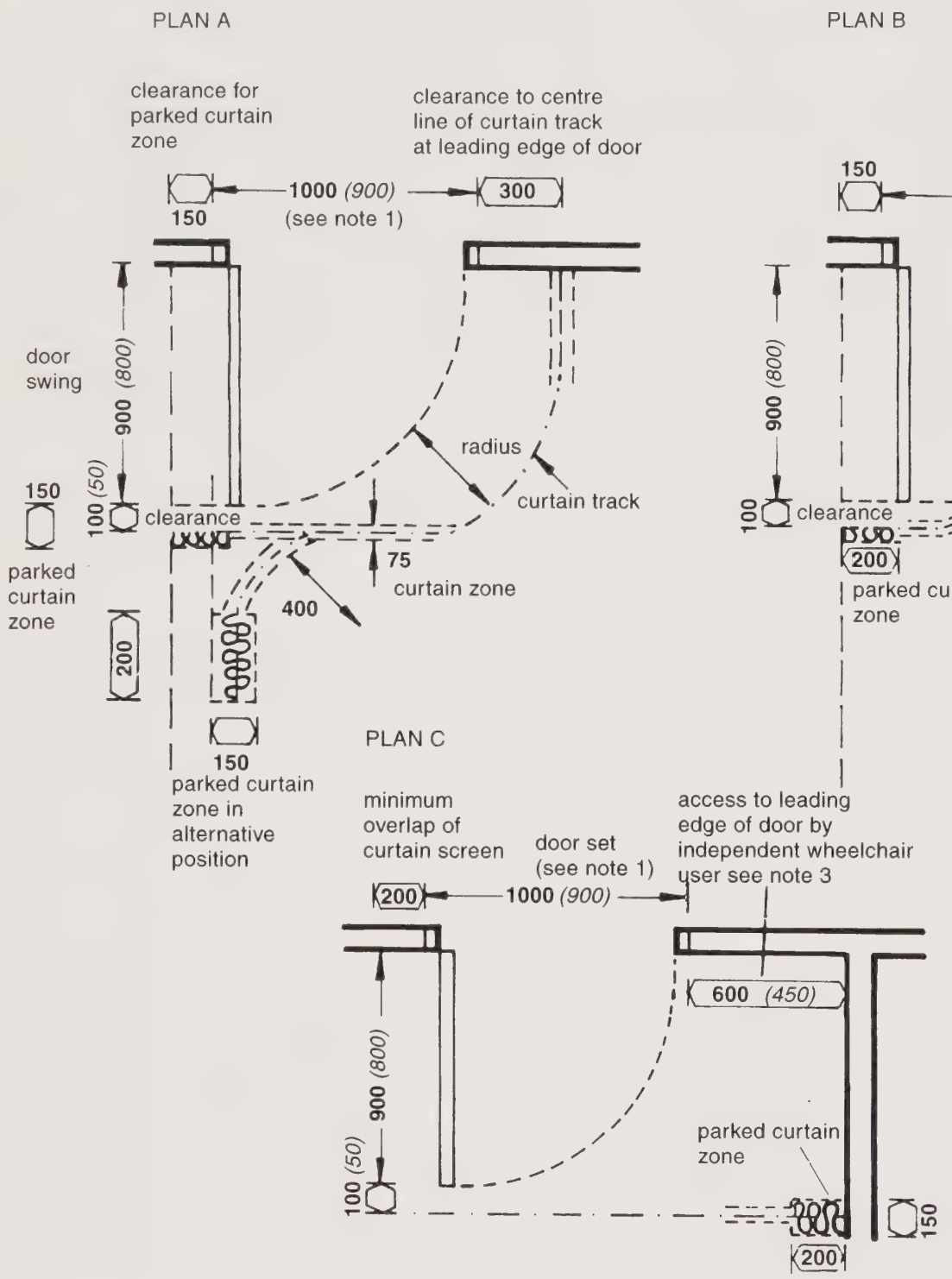
Activities:
Alternative screened door arrangements to provide privacy for patients in bathrooms, toilets or other facilities where staff entry or exit is necessary during patient use.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Door screens 1 - single door

1000, 900 door sets (see note 1)

Users:
Staff



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. It is not recommended that door sets smaller than 900 wide be used in patient areas in health buildings. Minimum 1000 wide door sets are preferred.

2. The minimum clearance dimensions shown allow for ambulant circulation only.

3. The critical requirement is for independent wheelchair use in this case, and the space required for this exceeds (i.e. will therefore accommodate) the space needs for ambulant staff access. Even the restricted space near the landing edge of the door is adequate for this purpose.

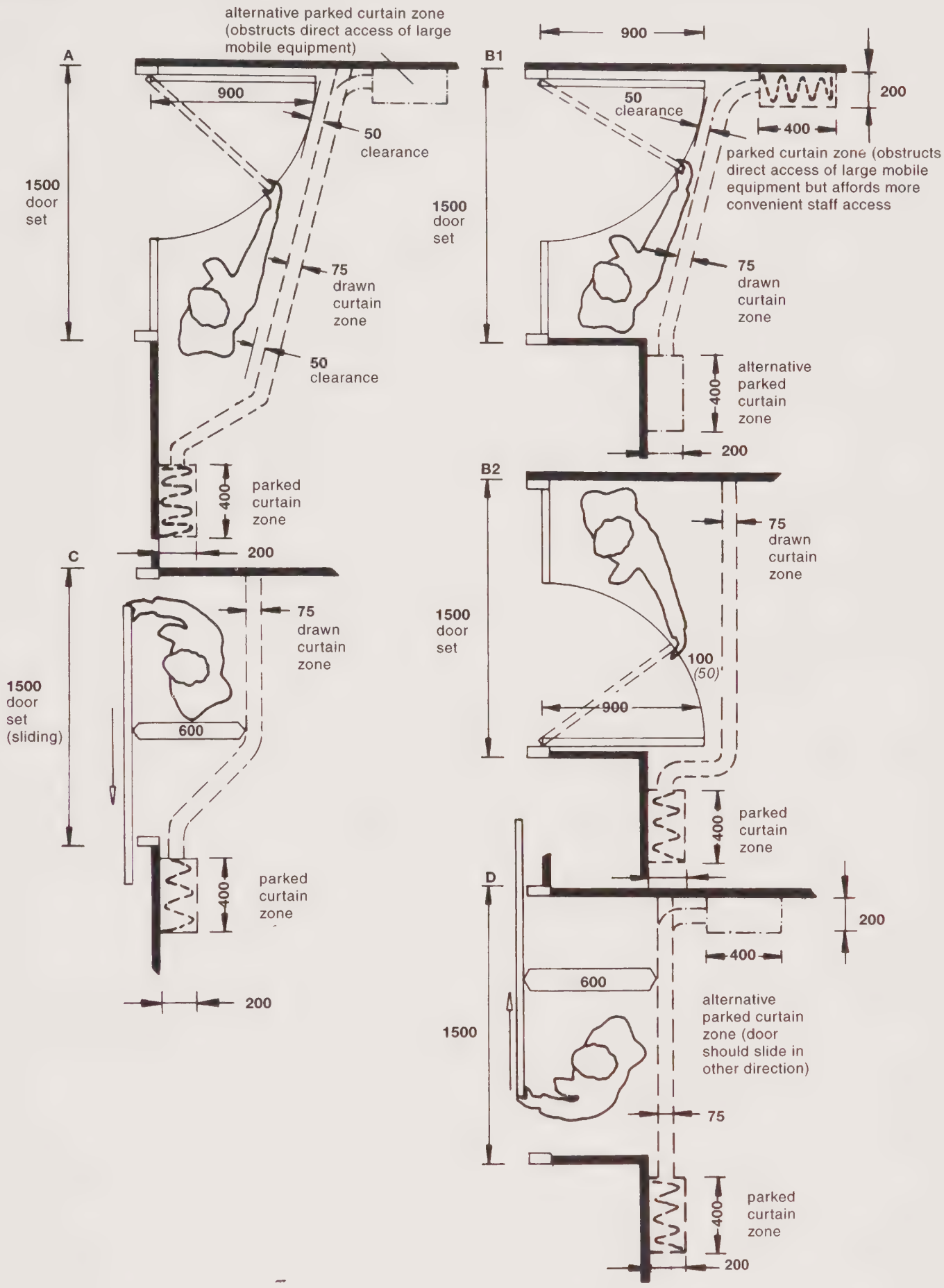
Activities:
Alternative screened door arrangements to provide privacy for patients in bathrooms, toilets or other facilities where staff entry or exit is necessary during patient use.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Door screens 2

1500 door sets (see note 1)

Users:
Staff



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Space must be available inside drawn curtain zone to open or close door. Approx. space requirement 800 (600) x 600. This space must be clear of main door swing.

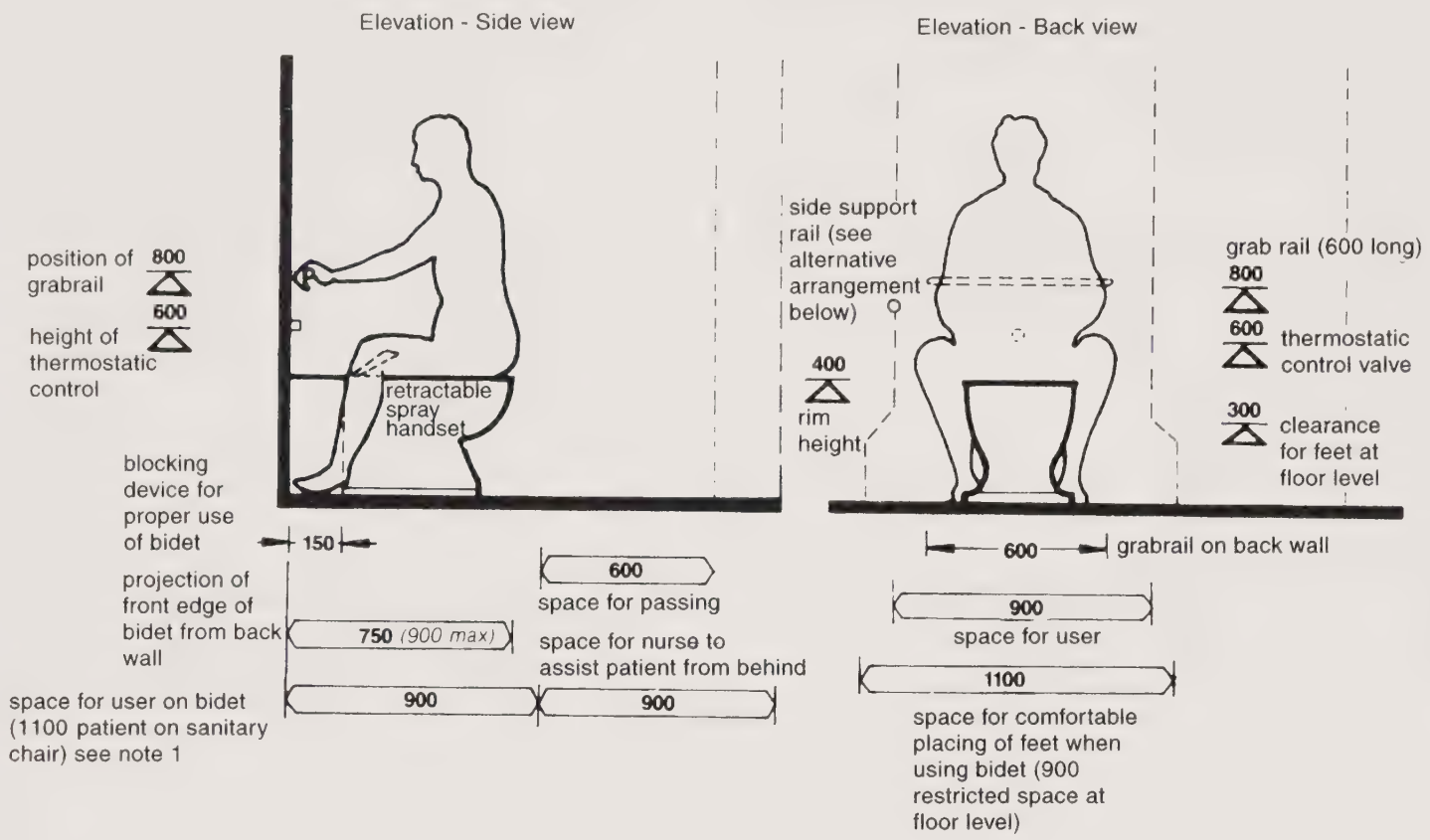
2. Although screening is not generally required when 1/2 leaf door is opened, it is recommended that the curtain should clear both leaves to avoid injury and damage.

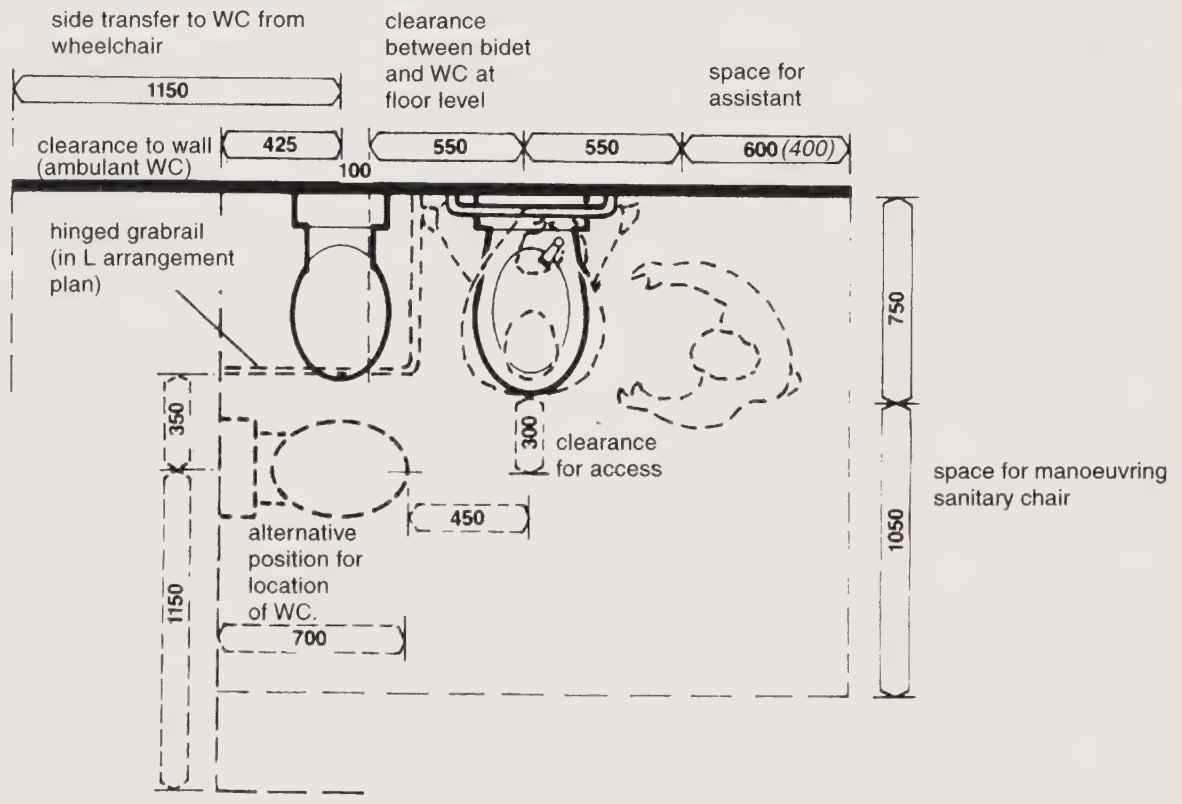
Activities:
Use of bidet. Space for transferring onto bidet from the WC with or without assistance. Assistance may be provided by one or two staff.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Bidet

Users:
Fully ambulant or semi-ambulant patients and patients on sanitary chairs, also possible use of wheelchair users (see note 1)





Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. The bidet is usually used in conjunction with the WC.

2. Wheelchair users must have some ability to stand in order to transfer from WC to bidet and back from bidet to wheelchair. Others would require to be manually lifted by 2 assistants. The 'L' shaped plan arrangement (with removable grab rail) is preferable for both categories of wheelchair users.

3. Spray handsets should be located in a position over the bidet bowl to minimise possible spillage, or spoiling of the handset in the bowl (see HTM 64).

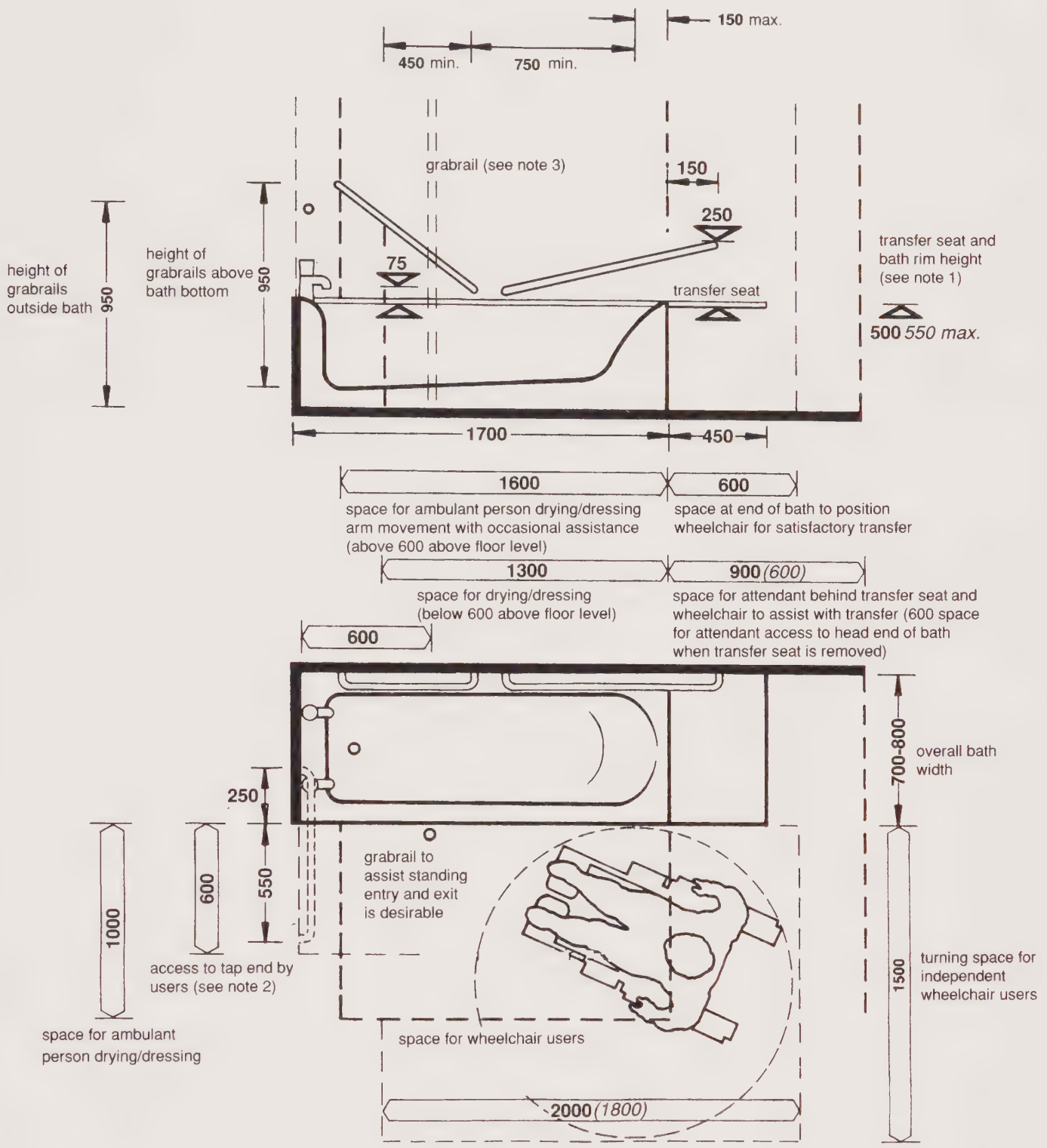
Activities:
Bathing including drying undressing / dressing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Bath 1

Wheelchair access

Users:
Fully ambulant adult patients and independent wheelchair users with minimal assistance


150 max.
450 min.
750 min.
grabrail (see note 3)
150
250
75
transfer seat
transfer seat and bath rim height (see note 1)
500 550 max.
height of grabrails outside bath
950
height of grabrails above bath bottom
950
1700
450
1600
600
space for ambulant person drying/dressing arm movement with occasional assistance (above 600 above floor level)
space at end of bath to position wheelchair for satisfactory transfer
1300
900 (600)
space for drying/dressing (below 600 above floor level)
space for attendant behind transfer seat and wheelchair to assist with transfer (600 space for attendant access to head end of bath when transfer seat is removed)
600
700-800
overall bath width
250
1000
600
550
grabrail to assist standing entry and exit is desirable
access to tap end by users (see note 2)
space for ambulant person drying/dressing
space for wheelchair users
1500
turning space for independent wheelchair users
2000 (1800)

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. The recommended maximum height for fixed baths is 500, but where principally used by wheelchair users 550 is recommended.
It is important that transfer seat height and bath rim coincide as any step can cause difficulty during entry or exit. Similarly wheelchair seat height should be standardised to facilitate the easiest possible transfer. The lower maximum of 500 is preferable for ambulant and semi-ambulant users.

2. Also space for access by assistant for cleaning the bath.

3. Grabrail - see data sheet on grabrails.

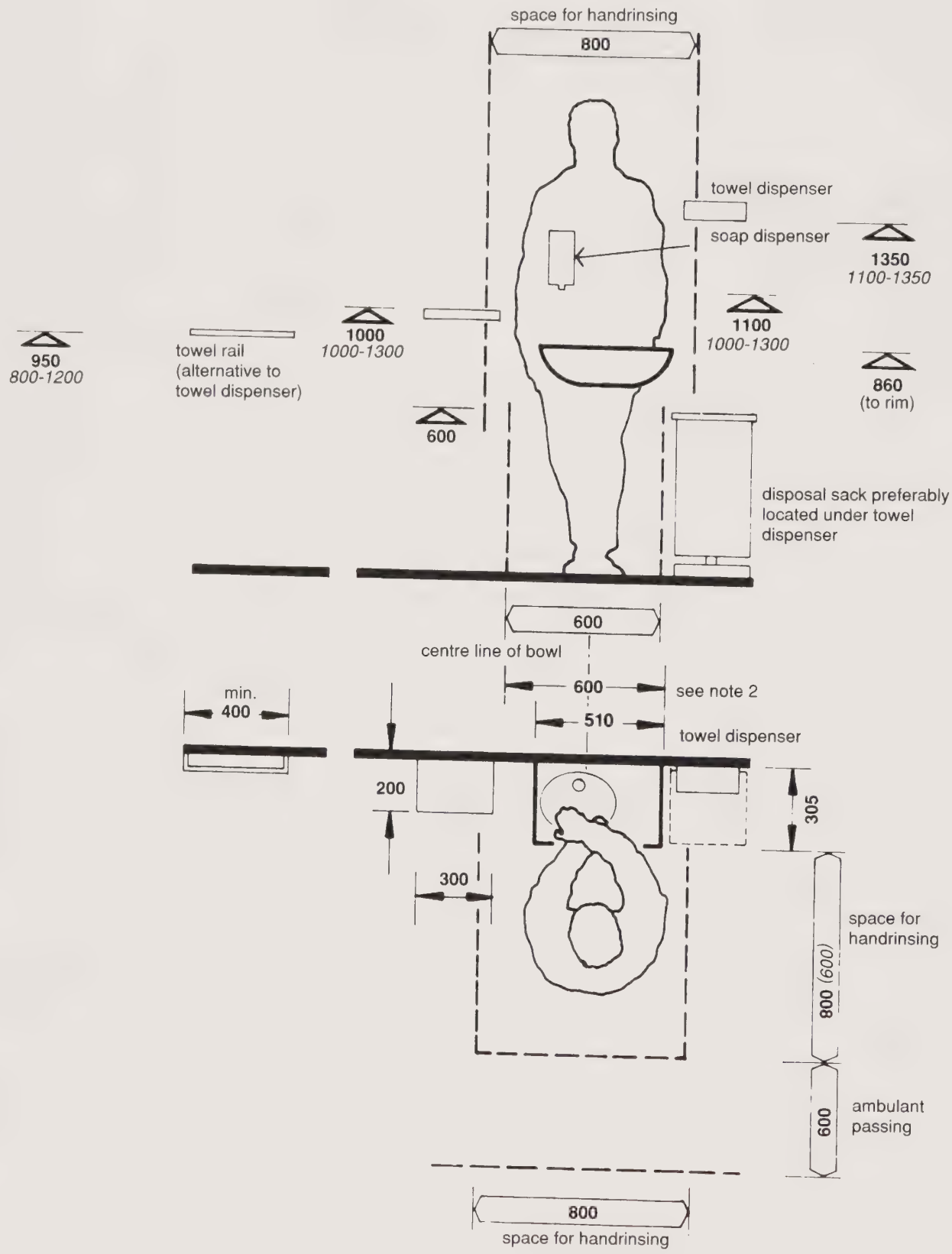
Activities:
Handrinsing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Basin 1

Handrinse

Users:
Fully ambulant staff, visitors and patients



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Reach dimensions to secondary components.
Forward reach from edge of basin - 450 (comfortable) 750 (maximum)
Sideways reach from centre line of basin - 750 (comfortable) 850 (maximum)

2. To minimise possible injury to tall users when leaning forward over basin it is preferable that within this zone, the front edge of the basin projects at least 250 beyond any fitting located above the basin. Where the basin is recessed, the space from the front edge of the basin to the wall surface should be 250 (200).

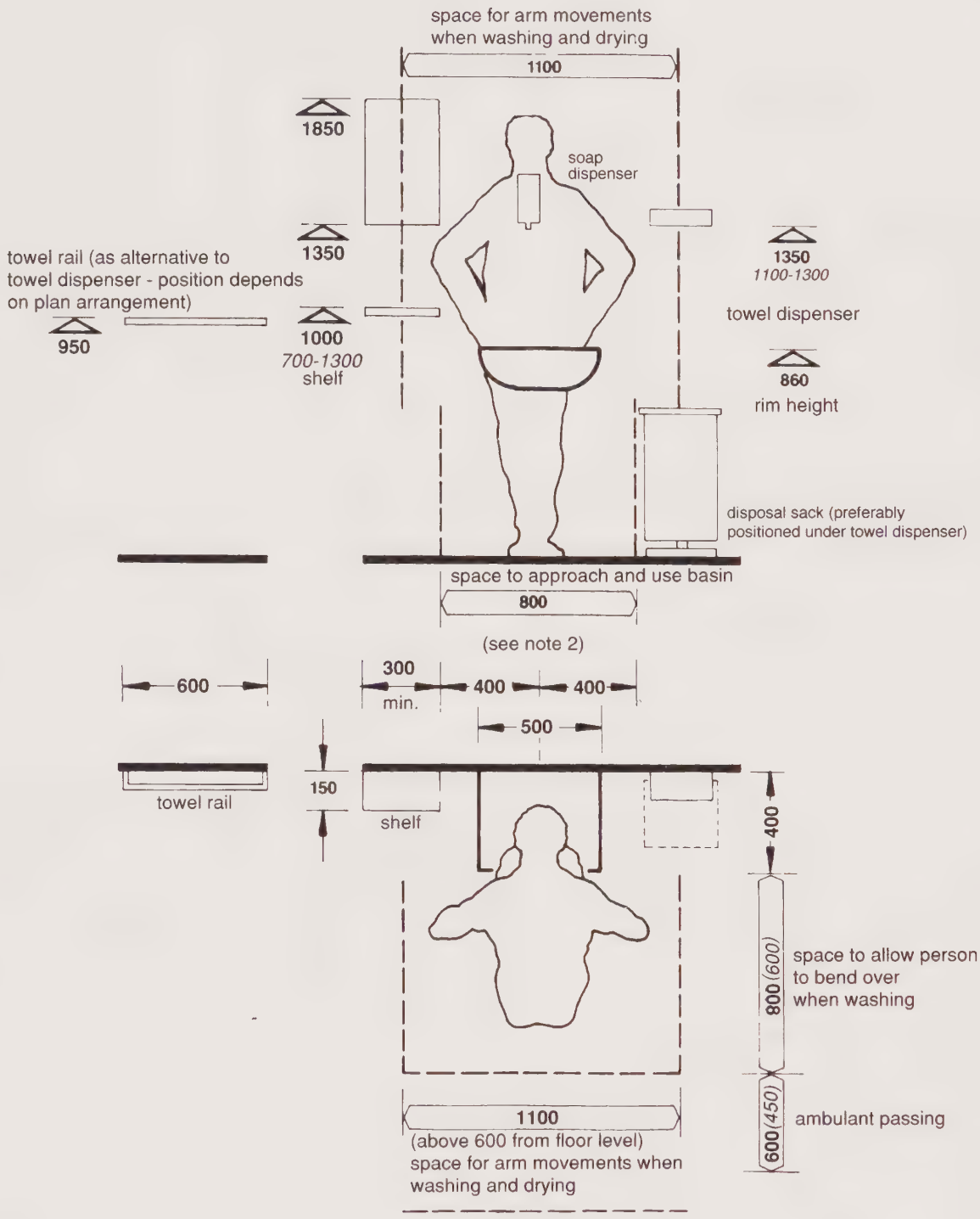
Activities:
Personal washing (hands, forearms, face etc.).

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Basin 2

Medium

Users:
Fully ambulant staff, visitors and patients



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

1. Reach dimensions to secondary components:
Forward reach from edge of basin - 450 (comfortable) 750 (maximum).
Sideways reach from centre line of basin - 750 (comfortable) 850 (maximum).

2. To minimise possible injury to tall users when leaning forward over basin, care should be taken in locating any associated item over the basin, within the 800 wide zone shown, and up to a height of 1800 above floor level.

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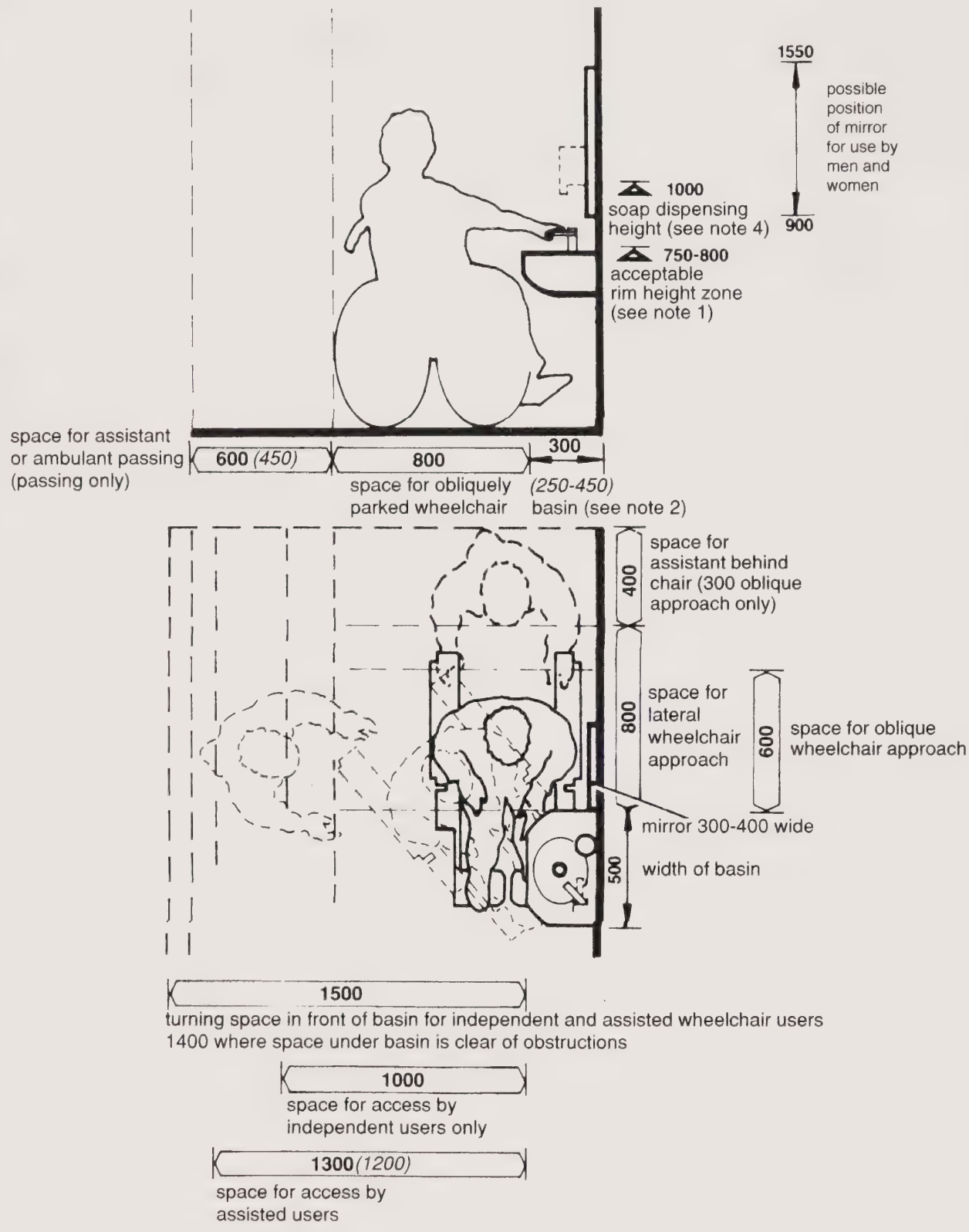
Activities:
Handrinsing.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Basin 3

Handrinse

Users:
Assisted and independent wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Rim heights between 700-750 would be preferable, but as basin profiles obstruct user access, it is essential to increase the rim height to provide knee space under the basin. The increase should be kept to a minimum. Rim heights over 800mm are unsatisfactory for small users.

2. Handrinse basin dimensions vary (250-450). Basins which project less than 300mm tend to be unsatisfactory in use, in that they do not adequately contain splashing. (This is a particularly critical requirement for seated users.) For this reason recessed basins, because they tend to be very shallow, are not favoured. Additionally, they restrict access and movement of hands, which is unsatisfactory for disabled users and the wall into which they are built prevents approach for comfortable reach of the bowl area.

3. Lever action taps are preferred for independent users.

4. Soap dispensers, and towel dispensers where provided, must not be positioned over the tap where dispensing action will be impeded.

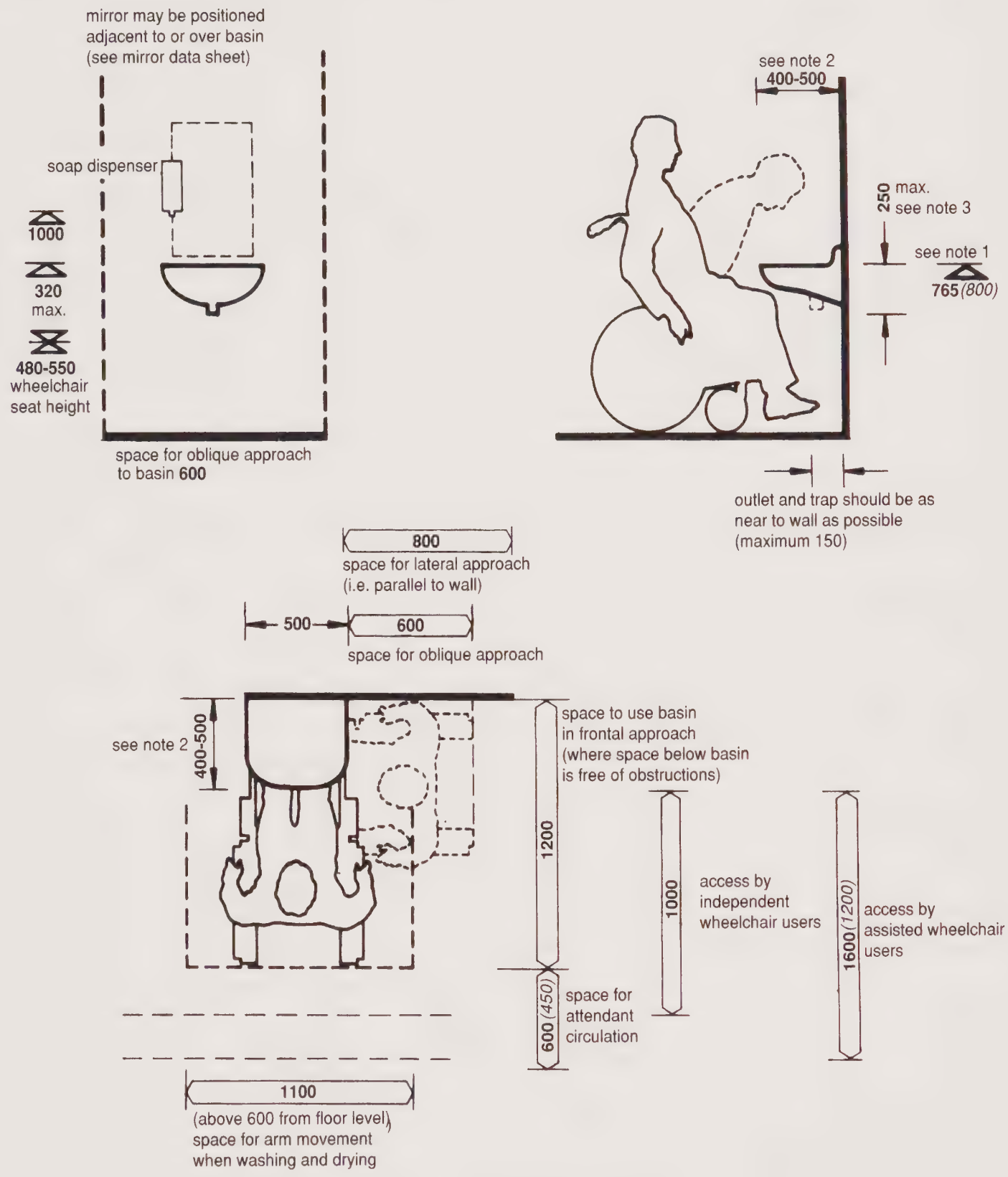
Activities:
Personal washing, hands, forearms, face etc.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Basin 4

Medium

Users:
Independent and assisted wheelchair users (also seated users)


mirror may be positioned adjacent to or over basin (see mirror data sheet)
soap dispenser
1000
320 max.
480-550 wheelchair seat height
space for oblique approach to basin 600
see note 2
400-500
250 max. see note 3
see note 1
765 (800)
outlet and trap should be as near to wall as possible (maximum 150)
800
space for lateral approach (i.e. parallel to wall)
500
600
space for oblique approach
see note 2
400-500
space to use basin in frontal approach (where space below basin is free of obstructions)
1200
1000
access by independent wheelchair users
1600 (1200)
access by assisted wheelchair users
600 (450)
space for attendant circulation
1100
(above 600 from floor level) space for arm movement when washing and drying

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Basin rim height - 765mm above floor level is recommended. This is slightly higher than ideal for normally seated users, but is necessary to accommodate the higher seat height of wheelchairs (480-550 as opposed to 430-440 for normal upright chairs). Deep cushions are frequently used giving seat heights of 520-550.

2. For personal washing activities by wheelchair users a basin projecting 500mm is preferred to provide adequate leg room under the basin in frontal approach. A depth of 500mm is essential for such activities as hair washing and face washing (maximum basin projection 700mm).

3. Care must be taken in the selection of basins for wheelchair or other seated users. Despite the need for relatively large cantilever projection, it is essential that the basin profile be as shallow as possible, i.e. it should be tapered from the rim to a depth preferably not exceeding 250mm (max.) at the outlet, which in turn should be positioned as near the supporting wall as possible.

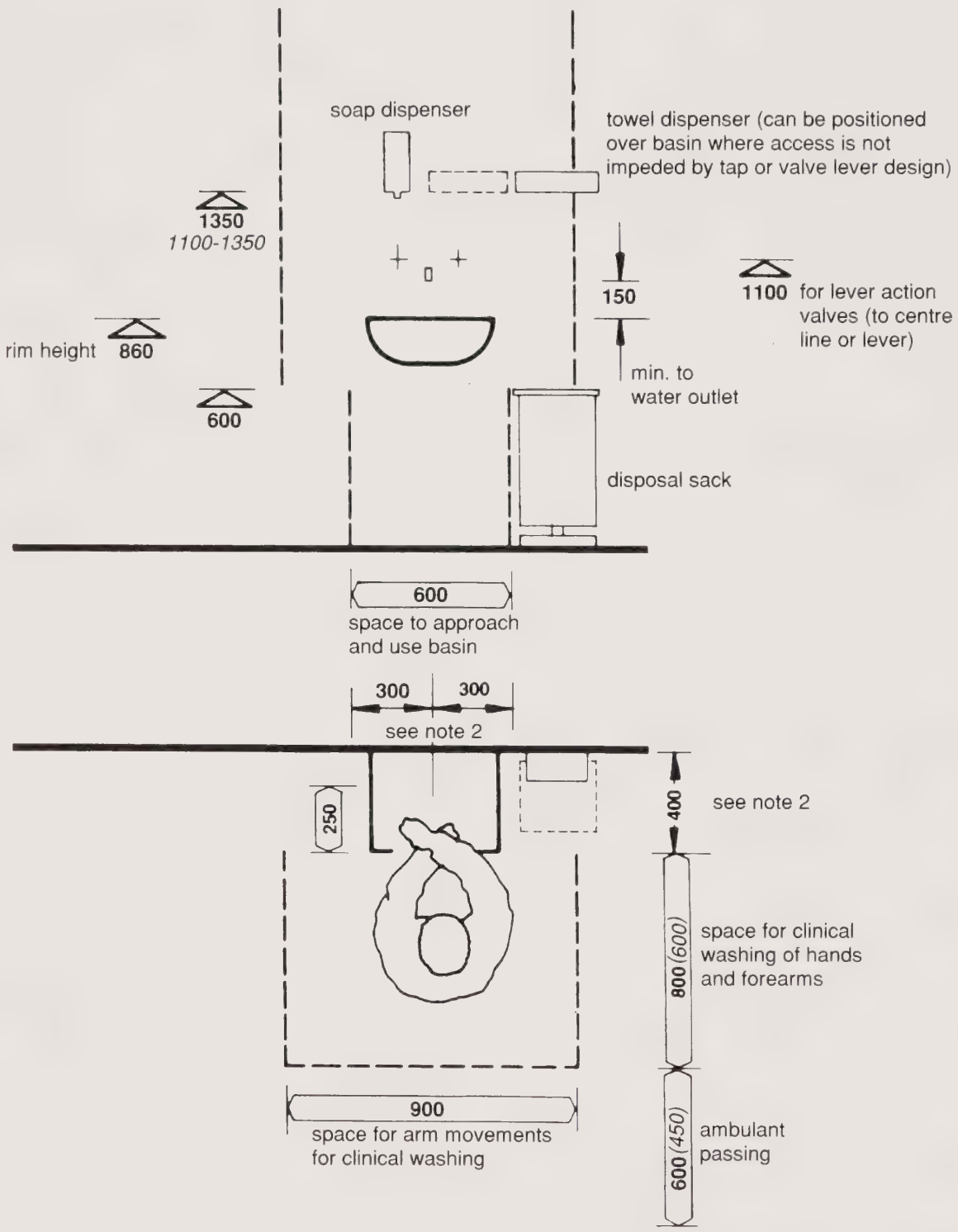
4. See HTM 64

Activities:
Clinical washing of hands and forearms.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Basin 5
Medium

Users:
Staff



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Reach dimensions to secondary components:
Forward reach from edge of basin - 450 (comfortable) 750 (maximum).
Sideways reach from centre line of basin - 750 (comfortable) 850 (maximum).

2. To minimise possible injury to tall users when leaning forward over basin care should be taken in locating any associated item over the basin, within the 600 wide zone shown, the front edge of the basin should project 250mm beyond any fitting up to a height of 1800 above floor level.

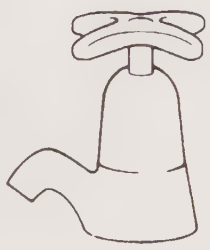
Activities:
Turning taps on and off.

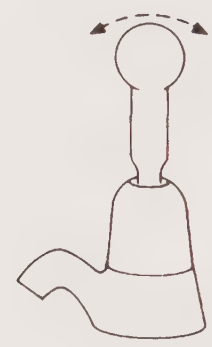
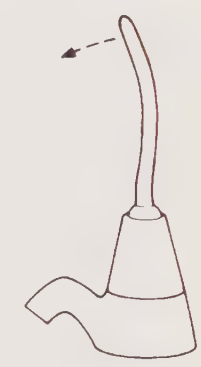
NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Taps 1

Basin

Users:
People with impaired hand function



	SCREW DOWN		TOGGLE ACTION	
	CROSS HEAD	DOME HEAD	BALL HEAD	EXTENDED LEVER/ KNOCK ON/OFF
POSSIBLE GROUPS OF USERS	Persons who have strong hands and good control + moderate grip strength.	Persons who have strong arms and hands (1. Where design is smooth or only slightly serrated, good grip strength is essential. 2. Broader heads, large domed surfaces, can be used by persons who cannot grip using palm of hand with wrist and arm movements only).	Persons who have arthritic hands or very poor co-ordination i.e. suitable for people not able to grip well but who have moderate strength and sufficient co-ordination to hold lever down largely using natural weight of arm.	Persons who can move arms, (but not necessarily hands) and have moderate strength and co-ordination to hold lever down as required.
RECOMMENDATIONS OF USE	Should generally only be used where user population have no manual disabilities or infirmity. Not recommended for use by the elderly.		For use where a large percentage of users are old, arthritic, or have generally poor co-ordination.	
MECHANISMS	Not self-closing (non concussive) thread which is screwed down when tap is in off position, screwed up when tap is open.		Can be either self-closing or not. Concussive valves tend to be difficult to control manually and water is consequently delivered in surges, which can be dangerous. Non concussive valves are therefore preferred.	
OTHER NOTES	1. Where screw taps are used, the head should provide a secure grip, thus cross head is preferred to dome head. 2. In both cases if a plastic thread is used as opposed to metal, friction is reduced and the tap is easier to turn. 3. See also adapter (cross head tap spanner). 4. Can also be fitted as remote taps, e.g. under or at front of worktop.		1. Very easy to use, but must be held in position to maintain waterflow. 2. Large ball heads (30-50mm diameter) are comfortable to use. 3. Toggle action valves should preferably have insulated handles.	

Maximum temperature as on all taps should be controlled by a thermostat, since people with impaired hand function often have sensory impairments or cannot react and move quickly enough to prevent scalding.

DIMENSIONS (mm) Total height above basin surface	100-110	100	155	220	
Distance from centre of tap to water source	75	75	75	75	

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Tap controls must be positioned so as to be accessible to the wheelchair user and be within range of comfortable reach. Adjacent floor space should if possible afford both forward and parallel approaches.

2. For wheelchair or seated use tap controls must be within the range of 60-1150 (restricted operation - 500-1250 where approach is unobstructed). Preferred height 850-900 depending upon type of operating mechanism.

3. Taps must be operable with one hand and should preferably not require tight grasp, a pinching action or excessive twisting of the wrist for satisfactory operation by a person who is manually handicapped. The force required should not exceed 22N (5lb/ft).

4. Owing to the very considerable variability of manual handicap among disabled people there is no single tap design which will always be satisfactory. Characteristic groups will often require individual consideration.

5. For persons with weak or arthritic hands, conventional screw-down taps are difficult to use. Spring-loaded self-closing taps, which need to be pushed down and held down for operation should not be fitted where there are disabled or debilitated users.

6. The temperature of water drawn from hot water sources used by elderly or disabled persons must be thermostatically controlled. Sensory impairment causes a high risk of injury by scalding. Manual mixing valves are not recommended, as the temperature can fluctuate rapidly due to unequal pressures in the hot and cold water supplies.

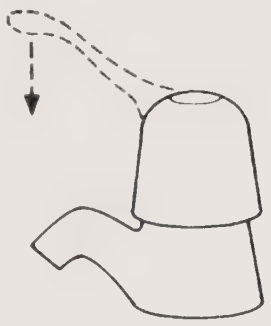
Activities:
Turning taps on and off.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Taps 2

Basin

Users:
People with impaired hand functioning



Single tap | Short Lever Tap | Mixer tap with 2 levers

	SPRING LOADED (PUSH DOWN) (Not Recommended)	LEVER ACTION		
		SINGLE ACTION LEVER	DUAL ACTION LEVER	1/4 TURN
POSSIBLE GROUPS OF USERS	Only suitable for persons who have strong wrists, hands and arms, and have co-ordination to hold tap down during operation.	Persons who have poor grip and a weak or poor wrist movement.		
RECOMMENDATIONS OF USE	Should only be used where user population is fit and not old and as a second choice to screw down taps. (Not recommended).	For use where a proportion of users are old, arthritic, have weak hands and wrists etc.		
MECHANISMS	Spring loaded taps are self closing and work by pressure on top forcing valve down and open. They normally require a great deal of force to stay open and are therefore unsuitable for debilitated persons.	Separate taps are required for hot and cold water supplies (they may be fed into basin through two taps or a mixer). Temperature of hot water is regulated by a thermostat. Lever only alters flow of water. Not self closing.	One tap carrying both hot and cold water. Movement of lever is in two directions e.g. vertically and horizontally to control on/off and temperature (maximum temperature should be regulated by a thermostat). Not self closing.	Separate taps are required for hot and cold water supplies, but movement of lever between off and full is through 90° max. (60° - 70° pref.). The seal off is applied pressure and the spindle does not revolve. Not self closing.
OTHER NOTES	1. Some push-down taps have levers which make operation easier, since the operating force required is decreased. However, this still remains excessive for persons with very weak hands.	1. Facilities used for personal washing should not have long lever arms forward when in the open position, as this impedes access to the sink or basin and is potentially hazardous when users lean forward. The positioning of taps should be carefully considered as access to soap dispensers etc. can be obstructed. The storage of items behind taps of this design is generally not recommended. 2. A valve where the return of the lever is retarded to avoid concussion is preferred. 3. Lever controls may be remote controls (see Taps 3).		

Maximum temperature as on all taps should be controlled by a thermostat, since people with impaired hand function often have sensory impairments or cannot react and move quickly enough to prevent scalding.

DIMENSIONS (mm) Total height above basin surface	50	200mm (single)	200mm (single)	200mm (average)
Distance from centre of tap to water source	75	100mm (single) 180mm (double)	100mm (single) 180mm (double)	100mm (single) 150-200mm (double)

Notes:

1. See Taps 1.

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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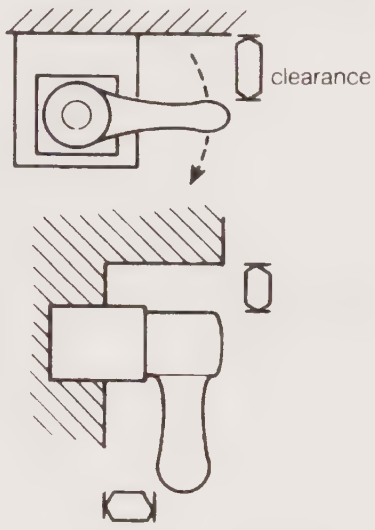
Activities:
Turning taps on and off.

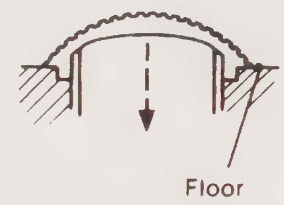
NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Taps 3

Basin

Users:
People with impaired hand functioning





	REMOTE CONTROL		
	LEVERS	PUSH-BUTTONS	FOOT OPERATED BUTTONS
POSSIBLE GROUPS OF USERS	Persons who have weak hands and wrists and who have restricted reach or co-ordination.	For persons who do not have much strength or co-ordination.	For persons who do not have use of arms.
RECOMMENDATIONS OF USE	For use by people in wheelchairs who have some use of arms but restricted reach.	For use by people in wheelchairs who have little use or co-ordination of hands, arms and restricted reach.	Not for use where population includes wheelchair users.
MECHANISMS	Taps are normally in the usual place but the operating mechanism is at the front of the basin unit or on the floor in front of the basin. Not self closing.		
OTHER NOTES	Where levers are located under the facia, the location action must minimise the need to reach under the worktop. Action parallel to front edge is therefore preferred.	For recommended dimensions and other characteristics for disabled use, see Manual controls, push buttons data sheet.	
Maximum temperature as on all taps should be controlled by a thermostat, since people with impaired hand function often have sensory impairments or cannot react and move quickly enough to prevent scalding.			
DIMENSIONS (mm) Lever length 150mm	pref. 100 min (all clearances 50mm min.)	Diameter or smallest dimension of button 40mm for palm operation and 25mm for finger or thumb operation.	Diameter of button min. 40mm pref. Displacement 15 - 25mm max.

Notes:

1. See Taps 1

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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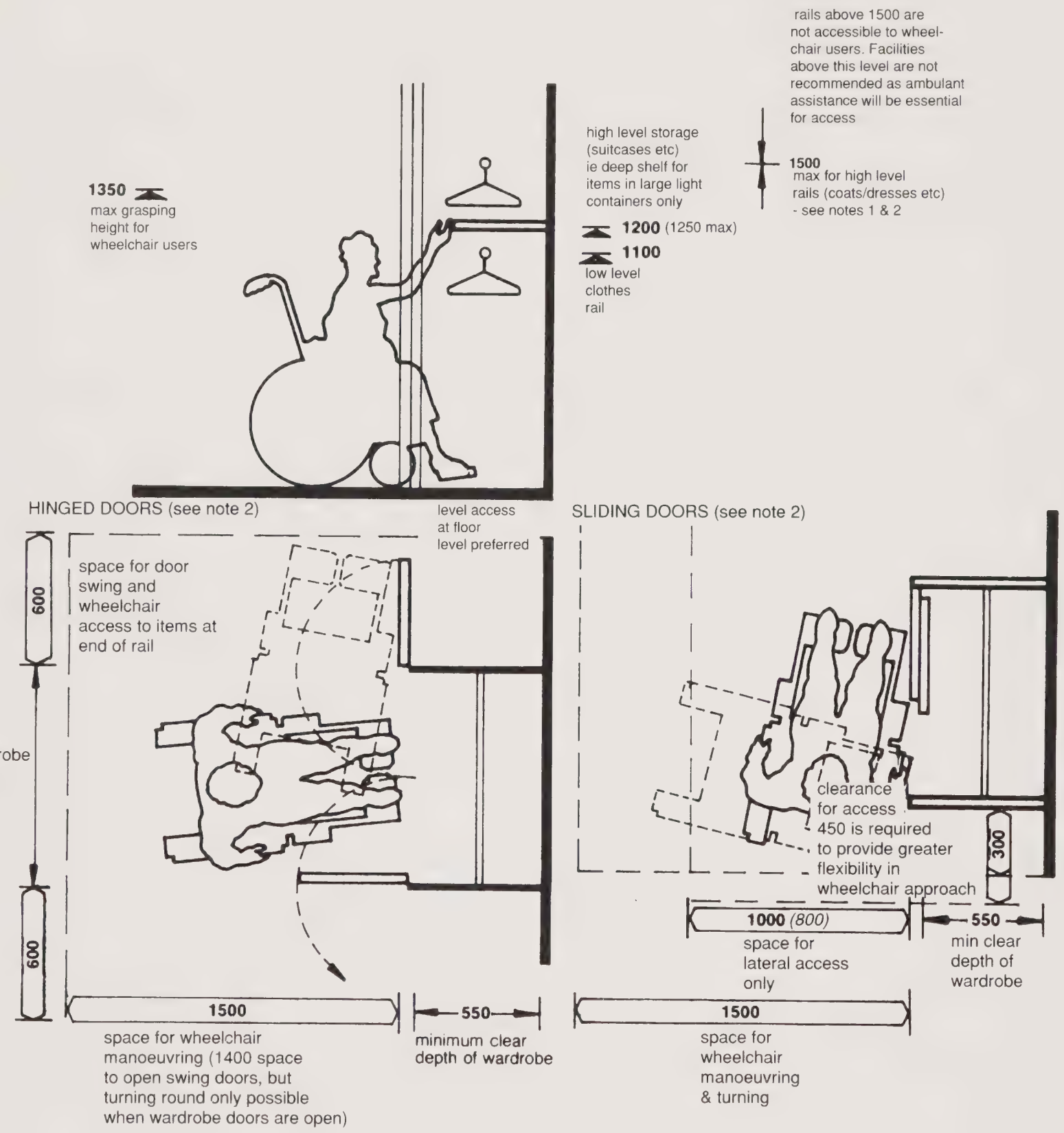
Activities:
Clothes storage.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Wardrobe 1

clothes storage, wheelchair users

Users:
Wheelchair users


1350
max grasping height for wheelchair users
high level storage (suitcases etc) ie deep shelf for items in large light containers only
1200 (1250 max)
1100
low level clothes rail
rails above 1500 are not accessible to wheel-chair users. Facilities above this level are not recommended as ambulant assistance will be essential for access
1500
max for high level rails (coats/dresses etc) - see notes 1 & 2
HINGED DOORS (see note 2)
level access at floor level preferred
space for door swing and wheelchair access to items at end of rail
600
wardrobe width
600
1500
space for wheelchair manoeuvring (1400 space to open swing doors, but turning round only possible when wardrobe doors are open)
550
minimum clear depth of wardrobe
SLIDING DOORS (see note 2)
clearance for access 450 is required to provide greater flexibility in wheelchair approach
300
1000 (800)
space for lateral access only
550
min clear depth of wardrobe
1500
space for wheelchair manoeuvring & turning

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. At 1500 the rail itself cannot be reached but it is just reachable with coat hangers and can be made more accessible with the use of long handled coat hangers.

2. Hinged doors allow good access to high level storage. Sliding doors give poor access to high level shelf storage and are recommended for high rail type units without shelf storage above only.

3. Ankle length long dresses require 1700-1800 from wardrobe floor level to rail and therefore cannot be stored satisfactorily in these wardrobes.

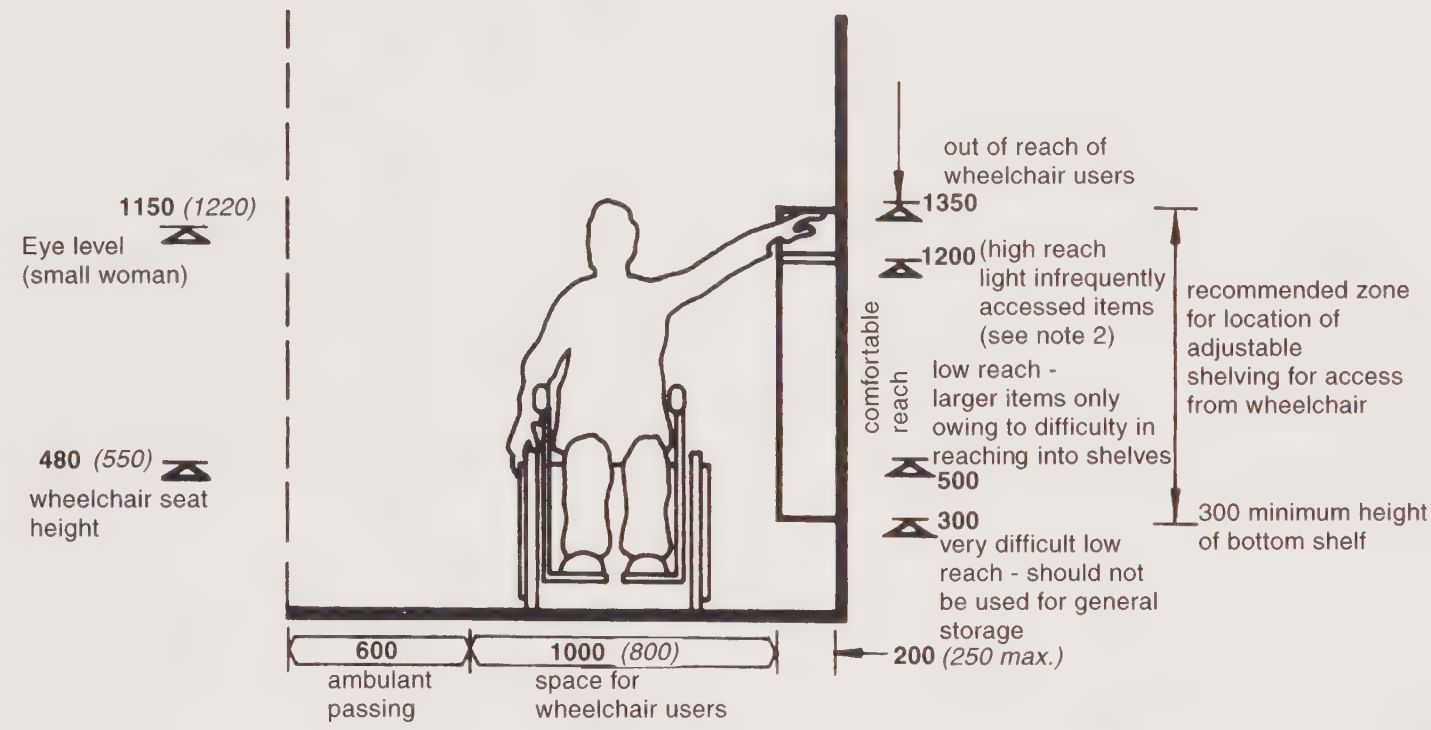
Activities:
Placing or retrieving items on shelves.

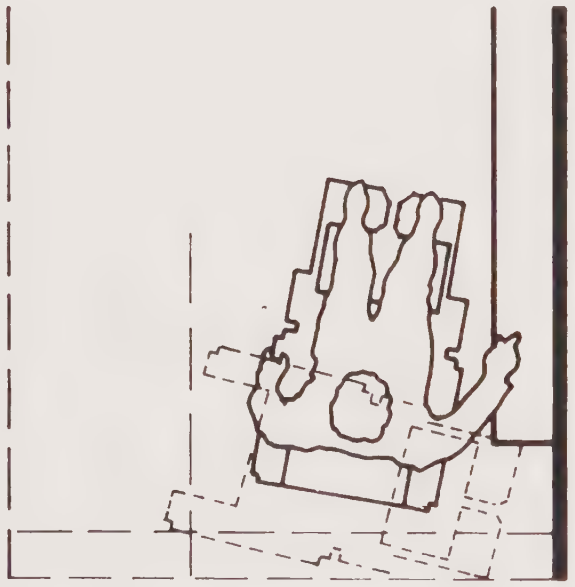
NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Shelving 3

Open 200 deep

Users:
Wheelchair users





300 *(200)*
see note 1
450 is required to provide greater
flexibility and freedom in approach
to access items on the end of shelves.

1400
space for general wheelchair manoeuvring
and turning (see note 2)

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Corner shelving is not easily accessible to wheelchair users, particularly if lateral approach only can be used.

2. This dimension assumes that feet and footrests of wheelchair will pass under the lowest shelf to allow turning. Where this is not possible clear dimension must be increased to at least 1500.

3. Maximum height refers to shelves where items stored are lightweight and of a size that can be easily handled.

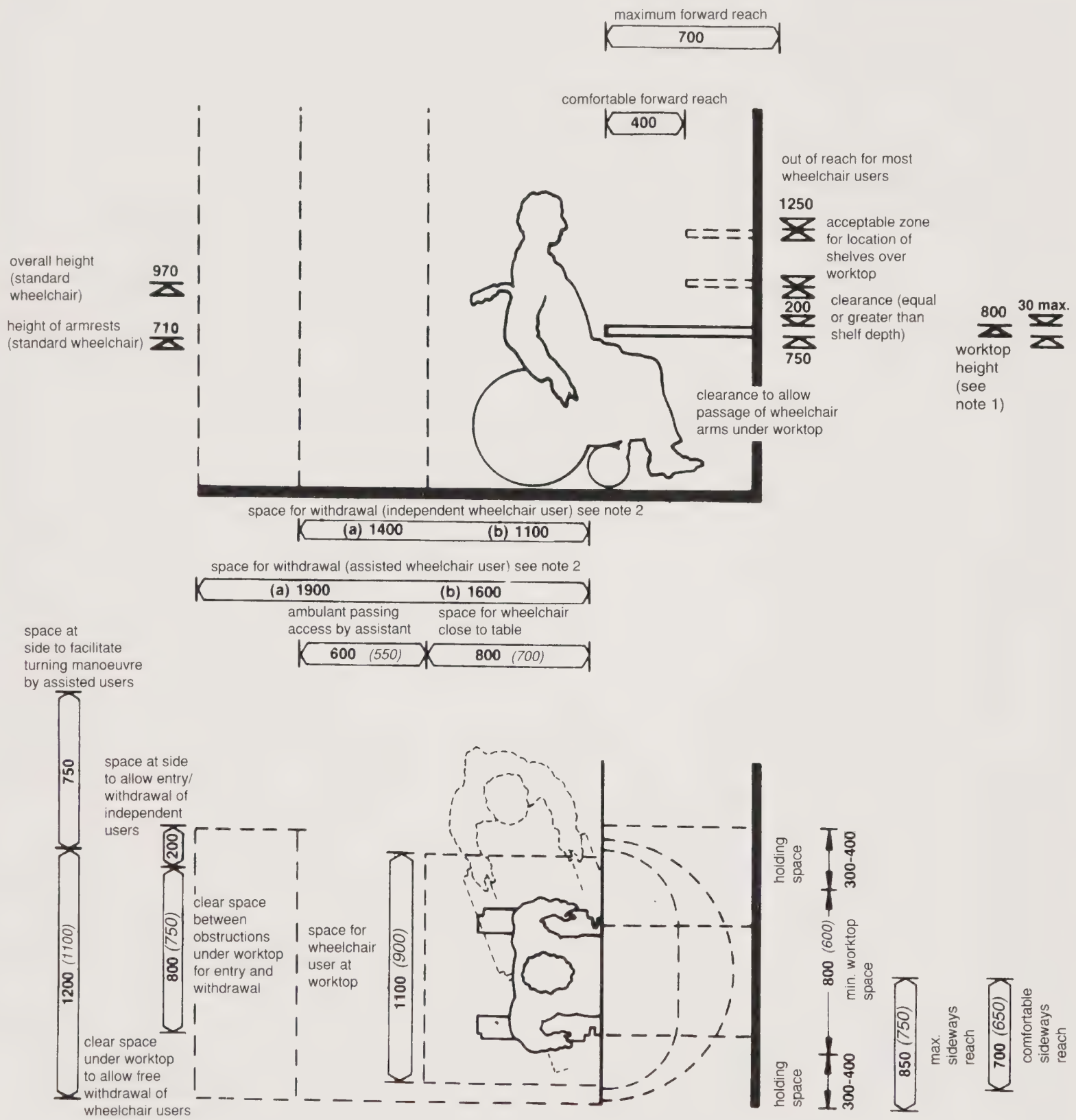
Activities:
General manual tasks. Placing or retrieving items on shelf over worktop.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Worktop bench 3

(with or without shelf over)

Users:
Independent and assisted wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Fitting heights to tasks is difficult in the case of wheelchair users as compromises are necessary to combat different wheelchair characteristics e.g. 800 worktop height is approx. 50mm higher than user elbow height and therefore not satisfactory for small female users. A table height of 750 is preferable for smaller users but may not offer adequate clearance under the worktop. This can be dangerous in that hands or thighs may be pinched when approaching the worktop, which is critical where users suffer from sensory loss. Some consideration should however be given to a 750 high worktop as this can also be used by most seated users so long as they are provided with an adjustable chair and footrest. This avoids the segregation of facilities for ambulant and wheelchair users.

2.
(a) Refers to space required for the more difficult manoeuvre of going in and out of an under worktop space 800 wide.

(b) Refers to conditions where full turning of the chair under the table is possible in at least one direction during entry or withdrawal.

Cupboards/storage units

(Notes to ergonomic data sheets)

1. It is difficult within domestic and other work areas such as kitchens to provide an adequate volume of storage space easily accessible to wheelchair users. A proportion of storage provision will almost inevitably be beyond reach. Frequently accessed items should therefore be given priority. Assistance may be essential to access other items.

2. Shallow cupboards and shelves are preferred as reaching into the back of deep shelves at low or high level is extremely difficult and potentially hazardous.

3. Below the worktop, drawers are preferable to cupboards. These can be deep enough to take tins, packets, pans etc. Drawers should slide smoothly and have an end stop to prevent a drawer or tray from being accidentally pulled out. A pull out mobile trolley is recommended to be out of the way and it can be housed under a worktop when not in use.

4. Cupboard doors which open fully to 180° make the whole area under the worktop accessible for storage and cleaning. Baskets, shelves, trays and carousels on backs of doors enable items to be placed and retrieved more easily than on conventional shelves, particularly in corner units to utilise otherwise "dead" space.

5. Handles must be within comfortable reach and easy to manipulate. "D" shaped handles are preferred. Recessed handles are not recommended.

6. For general use by wheelchair users, cupboards which only permit frontal access are not satisfactory. Space for lateral approach should also be provided wherever possible.

7. Where deep cupboards are essential, for example for linen storage, shelves should be not more than 400 mm deep. Slatted shelves should run at right angles to the cupboard door, to ease the movement of stored linen.

8. Broom/cleaning equipment cupboards should have floors flush with adjacent floors, to eliminate the need to lift heavy equipment (for example a vacuum cleaner). It will also allow the wheelchair to partially enter the cupboard allowing better posture when handling equipment of this kind.

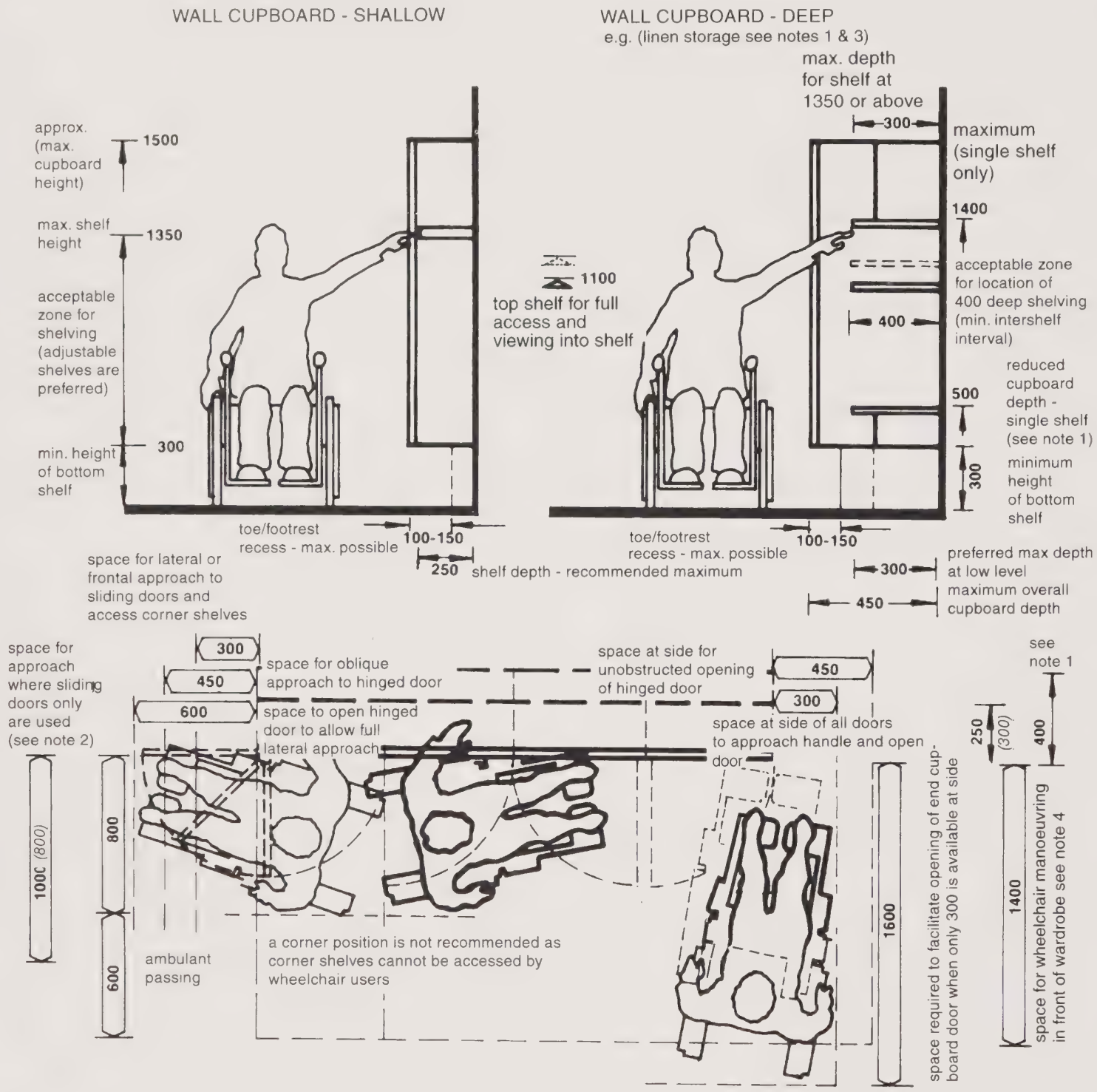
Activities:
Access to cupboards - including opening / closing doors and placing / retrieving items.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Cupboards 3

wall mounted shallow / deep

Users:
Wheelchair users


WALL CUPBOARD - SHALLOW
WALL CUPBOARD - DEEP
e.g. (linen storage see notes 1 & 3)
approx. (max. cupboard height)
1500
max. shelf height
1350
acceptable zone for shelving (adjustable shelves are preferred)
min. height of bottom shelf
300
toe/footrest recess - max. possible
100-150
250
shelf depth - recommended maximum
space for lateral or frontal approach to sliding doors and access corner shelves
max. depth for shelf at 1350 or above
300
maximum (single shelf only)
1400
acceptable zone for location of 400 deep shelving (min. intershelf interval)
400
1100
top shelf for full access and viewing into shelf
reduced cupboard depth - single shelf (see note 1)
500
minimum height of bottom shelf
300
toe/footrest recess - max. possible
100-150
preferred max depth at low level
300
maximum overall cupboard depth
450
space for approach where sliding doors only are used (see note 2)
300
450
600
space for oblique approach to hinged door
space to open hinged door to allow full lateral approach
space at side for unobstructed opening of hinged door
450
300
space at side of all doors to approach handle and open door
see note 1
250 (300)
400
1400
space for wheelchair manoeuvring in front of wardrobe see note 4
1000 (800)
800
600
ambulant passing
a corner position is not recommended as corner shelves cannot be accessed by wheelchair users
1600
space required to facilitate opening of end cupboard door when only 300 is available at side

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Shallow cupboards and shelves are preferred. Reaching to the back of deep shelves at high and low levels is extremely difficult and potentially dangerous for wheelchair users. Deep cupboards should therefore only be provided for specific items where deeper shelves are essential e.g. for linen storage.

2. Where space in front of sliding doors is only 1000 *(800)* full manoeuvring space must be conveniently available nearby.

3. Slatted shelves should run at right angles to the cupboard door to ease movement of stored linen.

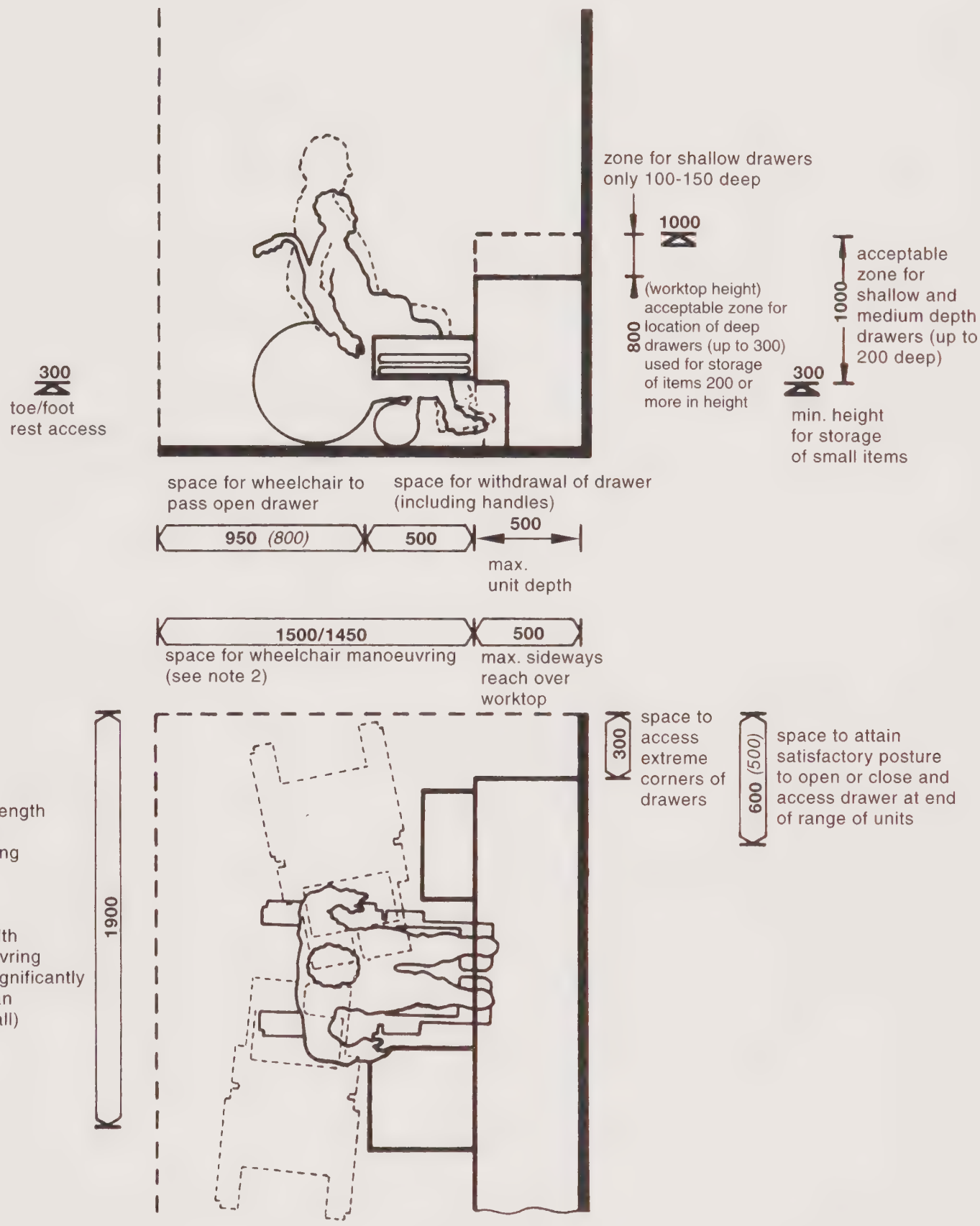
4. This dimension assumes that feet and footrests of wheelchair will pass under the lowest shelf to allow turning. Where this is not possible clear dimension must be increased to at least 1500.

Activities:
Access to drawers at low level.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Drawers 1

Users:
Fully ambulant and wheelchair users


zone for shallow drawers only 100-150 deep
1000
(worktop height) acceptable zone for location of deep drawers (up to 300) used for storage of items 200 or more in height
800
acceptable zone for shallow and medium depth drawers (up to 200 deep)
1000
300
min. height for storage of small items
300
toe/foot rest access
space for wheelchair to pass open drawer
space for withdrawal of drawer (including handles)
950 (800)
500
500
max. unit depth
1500/1450
space for wheelchair manoeuvring (see note 2)
500
max. sideways reach over worktop
pref. min. length of all manoeuvring space
1600 (where width of manoeuvring space is significantly greater than 1500 overall)
1900
300
space to access extreme corners of drawers
600 (500)
space to attain satisfactory posture to open or close and access drawer at end of range of units

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Pull out drawers are recommended for deep low level storage for wheelchair users. Deep low level cupboards are extremely difficult to use without special adaptors or aids.

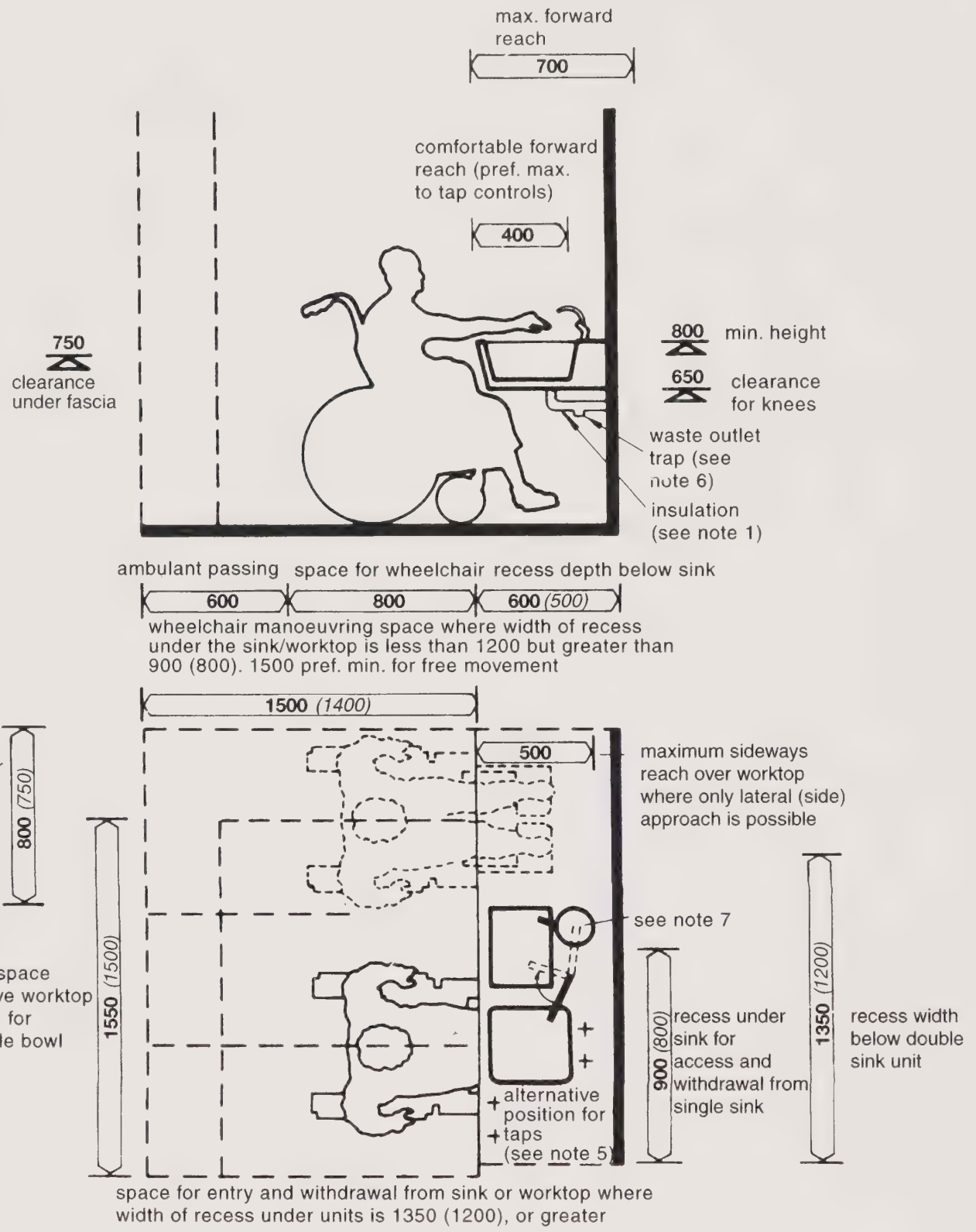
2. 1450 will allow turning where feet and footrest can pass under overhang of toe/ footrest recess. Where this is not possible however, the clear dimension must be increased to 1500 to allow 360° / 180° turns to be accommodated. This is essential in most dressing and frequently used areas.

Activities:
General kitchen use.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Sink 1

Users:
Wheelchair users


max. forward reach
700
comfortable forward reach (pref. max. to tap controls)
400
750
clearance under fascia
800 min. height
650 clearance for knees
waste outlet trap (see note 6)
insulation (see note 1)
ambulant passing
600
space for wheelchair
800
recess depth below sink
600 (500)
wheelchair manoeuvring space where width of recess under the sink/worktop is less than 1200 but greater than 900 (800). 1500 pref. min. for free movement
1500 (1400)
space under associated worktop for access and withdrawal
800 (750)
500
maximum sideways reach over worktop where only lateral (side) approach is possible
see note 7
workspace (above worktop level) for single sink
1100
workspace (above worktop level) for double bowl sink
1550 (1500)
alternative position for taps (see note 5)
900 (800)
recess under sink for access and withdrawal from single sink
1350 (1200)
recess width below double sink unit
space for entry and withdrawal from sink or worktop where width of recess under units is 1350 (1200), or greater

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. The underside of sink and exposed pipes must be insulated because of danger of the thighs and knees contacting hot surfaces.

2. The sink should be as deep as possible (140) to minimise spillage.

3. The sink overflow must always be provided as disability may affect tap control.

4. Deep fascias to units should be avoided as they impede wheelchair arm rest and user approach.

5. Selection and positioning of tap controls should be given careful consideration. Tap controls should preferably be located away from the swivel arm mixer to ensure that access is not obstructed by cascading water.

6. Waste outlet trap should be positioned near back wall to minimise obstruction to knee access under sink or located in duct (see HTM 64).

7. An adjacent flat surface within reach of swivel arm mixer is an important requirement for full saucepans and kettles.

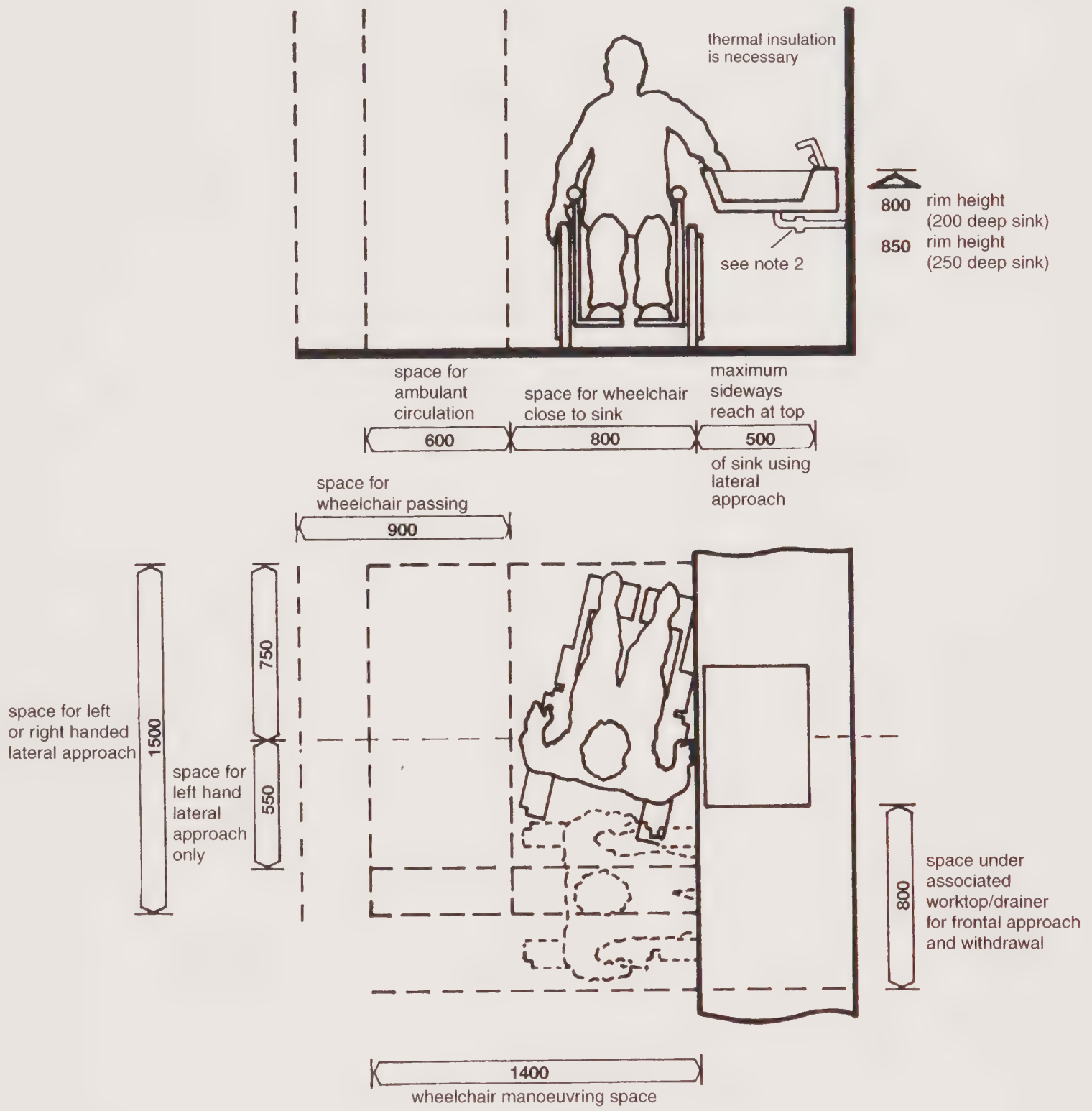
Activities:
Rehabilitation - laundry work using lateral approach (see also Sink 3, laundry work using frontal approach).

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Sink 2

Laundry, (200-250)

Users:
Wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Laundry work requires deeper sink than is usually required for general kitchen activities - i.e. 200-250 mm deep as opposed to 140 -150 mm. Consequently, using the sink from the wheelchair presents problems which make designing a satisfactory workstation very difficult. In trying to provide adequate knee access space below the sink, the rim height becomes excessively high and vice versa.

2. Waste outlet and trap should be positioned as near to the back wall as possible to minimise obstruction to knees under the sink. Waste and hot water pipes should be insulated to avoid injury to legs or be located in a duct (see HTM 64).

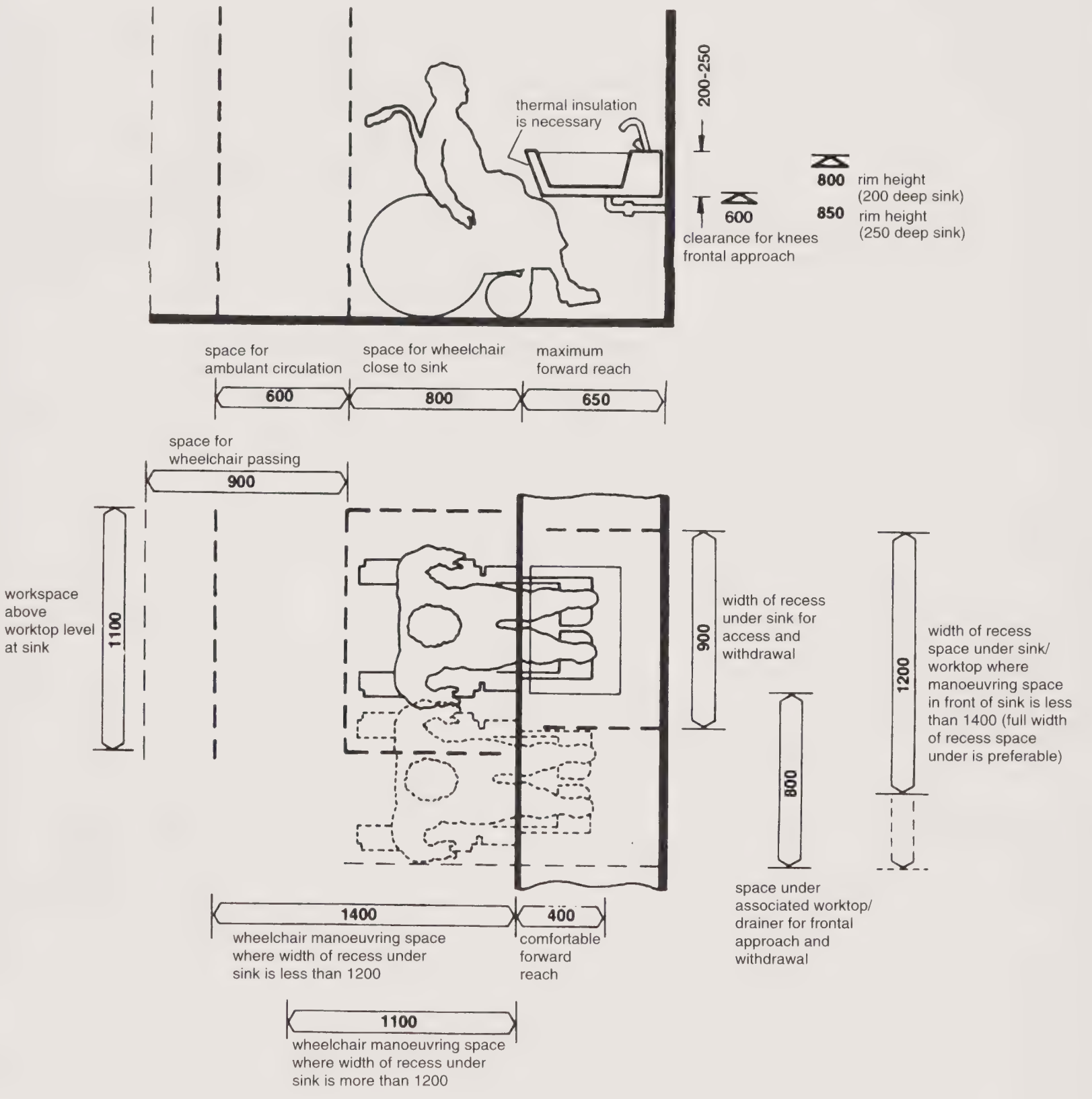
Activities:
Rehabilitation - laundry work using frontal approach (see also Sink 2, laundry work using lateral approach).

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Sink 3

Laundry, (200-250)

Users:
Wheelchair users


thermal insulation is necessary
200-250
800 rim height (200 deep sink)
850 rim height (250 deep sink)
600
clearance for knees frontal approach
space for ambulant circulation
600
space for wheelchair close to sink
800
maximum forward reach
650
space for wheelchair passing
900
workspace above worktop level at sink
1100
900
width of recess under sink for access and withdrawal
800
space under associated worktop/ drainer for frontal approach and withdrawal
1200
width of recess space under sink/ worktop where manoeuvring space in front of sink is less than 1400 (full width of recess space under is preferable)
1400
wheelchair manoeuvring space where width of recess under sink is less than 1200
400
comfortable forward reach
1100
wheelchair manoeuvring space where width of recess under sink is more than 1200

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Laundry work requires deeper sink than is usually required for general kitchen activities - i.e. 200-250 mm deep as opposed to 140 -150 mm. Consequently, using the sink from the wheelchair presents problems which make designing a satisfactory workstation very difficult. In trying to provide adequate knee access space below the sink, the rim height becomes excessively high and vice versa.

2. For some users it may not be practicable to attempt providing for frontal approach. Although it provides a less satisfactory posture, planning in this case should cater for a lateral approach only. See also Sink 2, Laundry work using lateral approach.

3. Waste outlet and trap should be positioned as near to the back wall as possible to minimise obstruction to knees under the sink. Waste and hot water pipes should be insulated to avoid injury to legs or be located in a duct (see HTM 64).

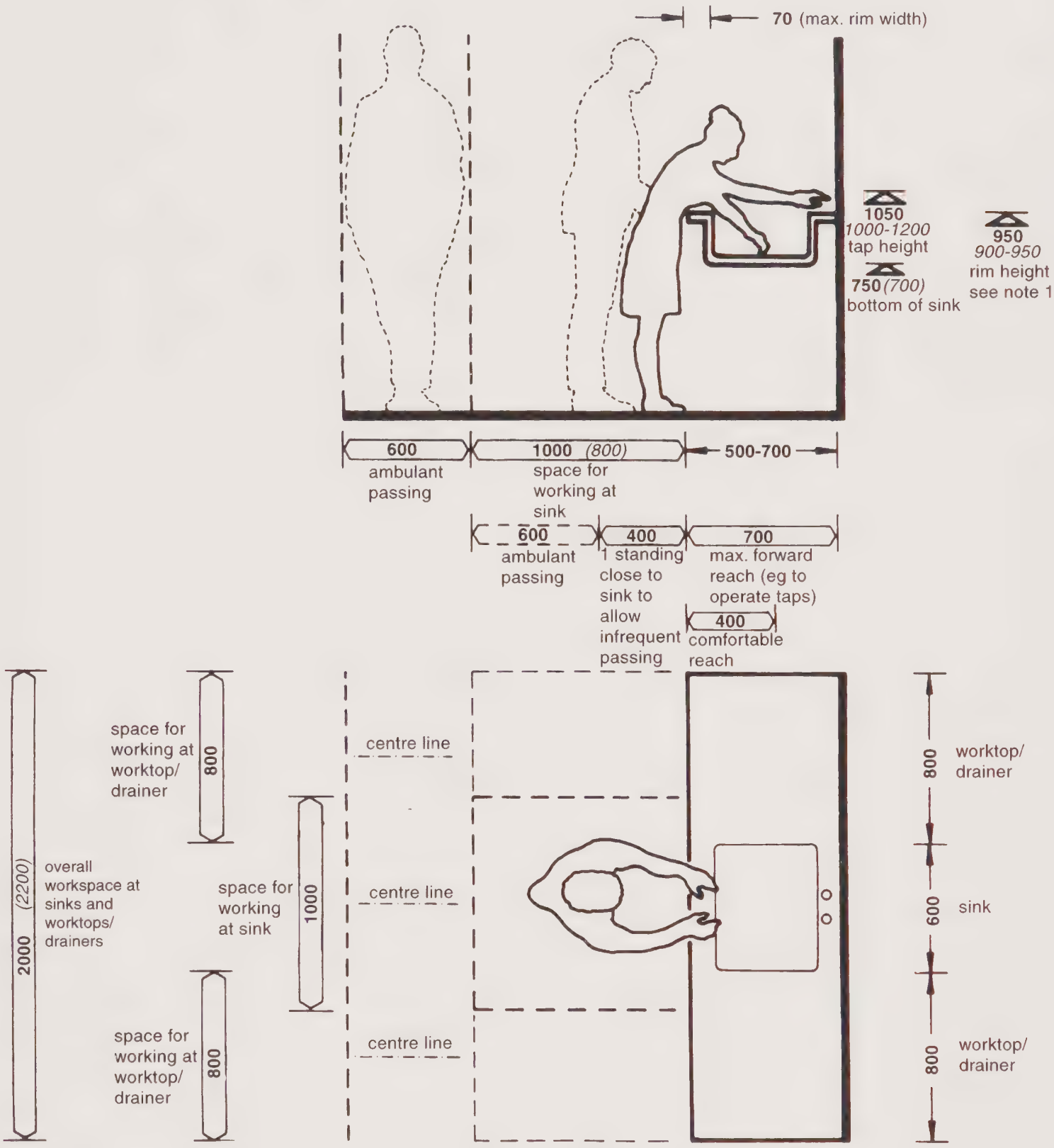
Activities:
General use.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Sink 4

Stainless steel, single with draining board(s)

Users:
Fully capable adults



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. The preferred sink rim height for both male and female use is 950. Where it is considered dangerous or unacceptable for the sink rim height to be above the worktop height, both should be at 900, although this will result in taller users having to bend down to use the sink.

2. It is preferable that single sinks should have a worktop or drainer on either side, except where sinks are positioned adjacently when a worktop or drainer should be available either side of each double sink.

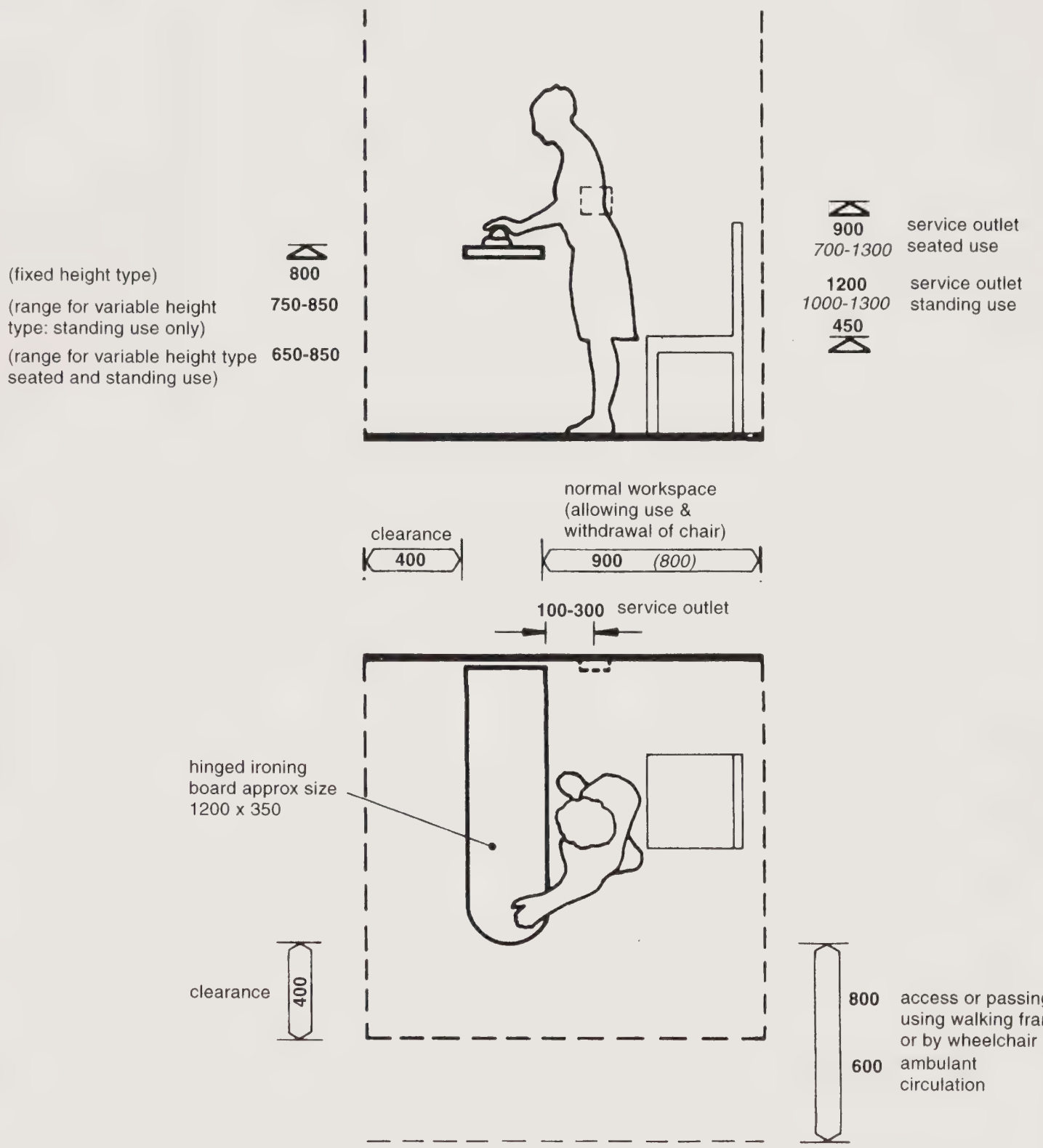
Activities:
Ironing clothes, rehabilitation.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Ironing board 1

Hinged, drop down fixed height or variable height

Users:
Semi-ambulant (including the elderly), standing or seated users


(fixed height type) 800
(range for variable height type: standing use only) 750-850
(range for variable height type seated and standing use) 650-850
900 *700-1300* service outlet seated use
1200 *1000-1300* service outlet standing use
450
clearance 400
normal workspace (allowing use & withdrawal of chair) 900 *(800)*
100-300 service outlet
hinged ironing board approx size 1200 x 350
clearance 400
800 access or passing using walking frame or by wheelchair
600 ambulant circulation

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

1. Portable ironing boards tend to be unsteady and difficult to erect. Secure hinged, drop down boards with variable height facility are preferred for partially capable people.

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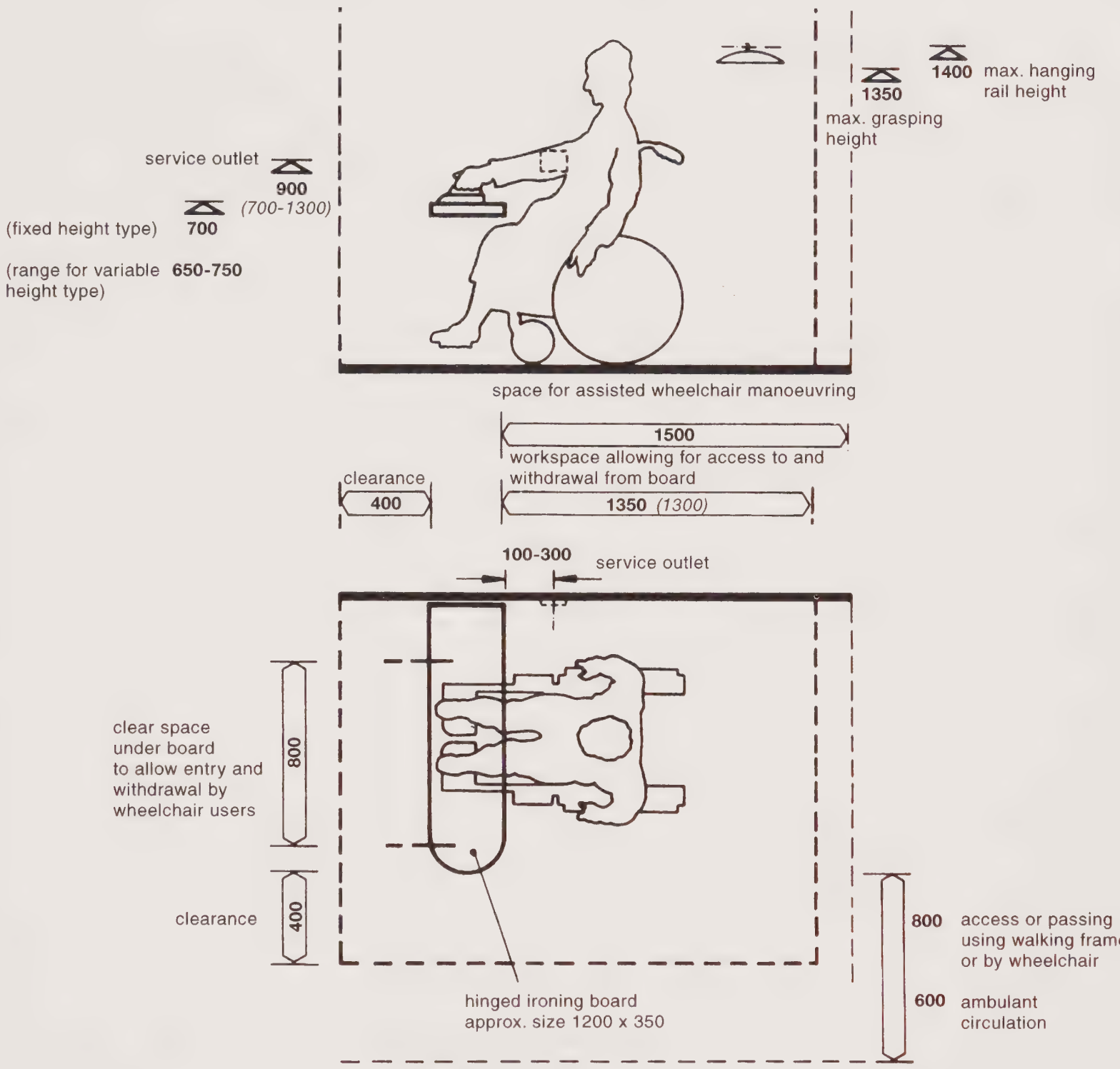
Activities:
Ironing clothes, rehabilitation.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Ironing board 2

Hinged, drop down fixed height or variable height

Users:
Assisted and independent wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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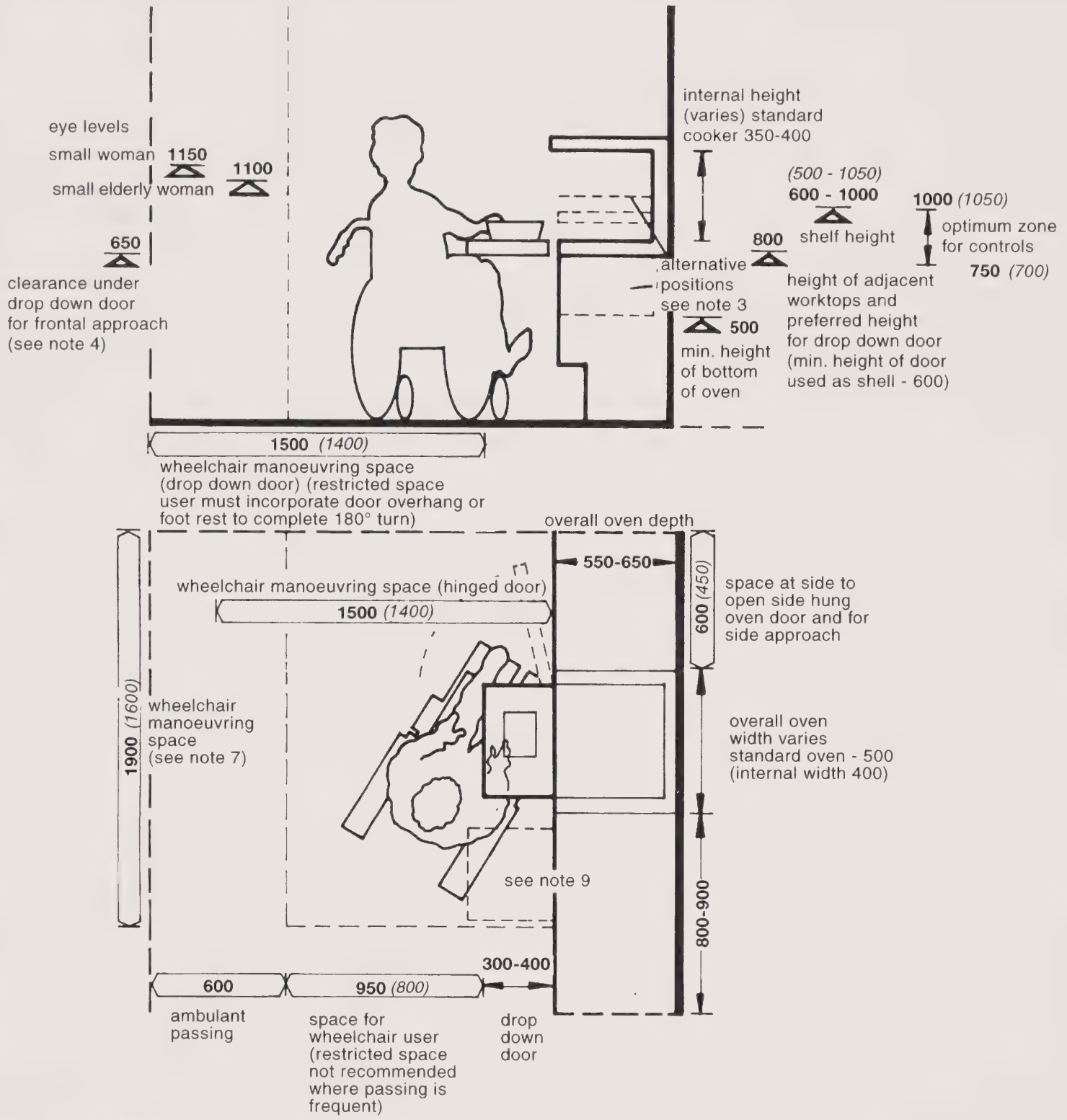
1. Portable ironing boards tend to be unsteady and difficult to erect. Secure hinged, drop down boards with variable height facility are preferred for partially capable people.

Activities:
Cooking by baking or roasting.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Oven 1
small

Users:
Wheelchair users


eye levels
small woman 1150
small elderly woman 1100
650
clearance under drop down door for frontal approach (see note 4)
internal height (varies) standard cooker 350-400
(500 - 1050)
600 - 1000
shelf height
1000 (1050)
optimum zone for controls
750 (700)
800
height of adjacent worktops and preferred height for drop down door (min. height of door used as shell - 600)
alternative positions see note 3
500
min. height of bottom of oven
1500 (1400)
wheelchair manoeuvring space (drop down door) (restricted space user must incorporate door overhang or foot rest to complete 180° turn)
overall oven depth
550-650
wheelchair manoeuvring space (hinged door)
1500 (1400)
600 (450)
space at side to open side hung oven door and for side approach
1900 (1600)
wheelchair manoeuvring space (see note 7)
overall oven width varies standard oven - 500 (internal width 400)
see note 9
800-900
300-400
600
950 (800)
ambulant passing
space for wheelchair user (restricted space not recommended where passing is frequent)
drop down door

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Oven shelves should be pull out, be non tip and incorporate a safety stop to avoid accidents. Full pull out can however conflict with the usefulness of a drop down door, where this is provided (see note 2). In such cases, pull out shelf should incorporate a stop 1/3 x the projection of the drop down door.

2. Ovens with drop down doors are generally preferred for wheelchair users as they provide a surface on which items can be temporarily held, but where shelves are not pull out, user approach is restricted, also internal oven height is limited by the need to minimise oven door projection (400 max.). See also note 1 above.

3. The higher position is more satisfactory where the oven is also to be accessed by ambulant users.

4. Face of drop down door or bottom edge of side hung door at or near 650 should be insulated to minimise the danger of burning user's legs.

5. Where a grill is incorporated, the heating element should preferably not be higher than 1100 (150) and grilling plane not lower than 600, but preferably at or near worktop height.

6. Worktop should be on side of leading edge of hinged door, can be parallel at 90° to oven, but clear width must be available to facilitate wheelchair approach.

7. Dimension depends upon type of oven door. A workspace under 1600 is very restrictive and smaller dimensions, although possible, cannot therefore be recommended.

8. Hinged oven doors should preferably open 180°. This is essential where bottom of door is lower than 650 above floor level.

9. When the oven has hinged door, there should be an adjacent pull out shelf. Minimum dimensions 400 x 400 minimum height 750 (650).

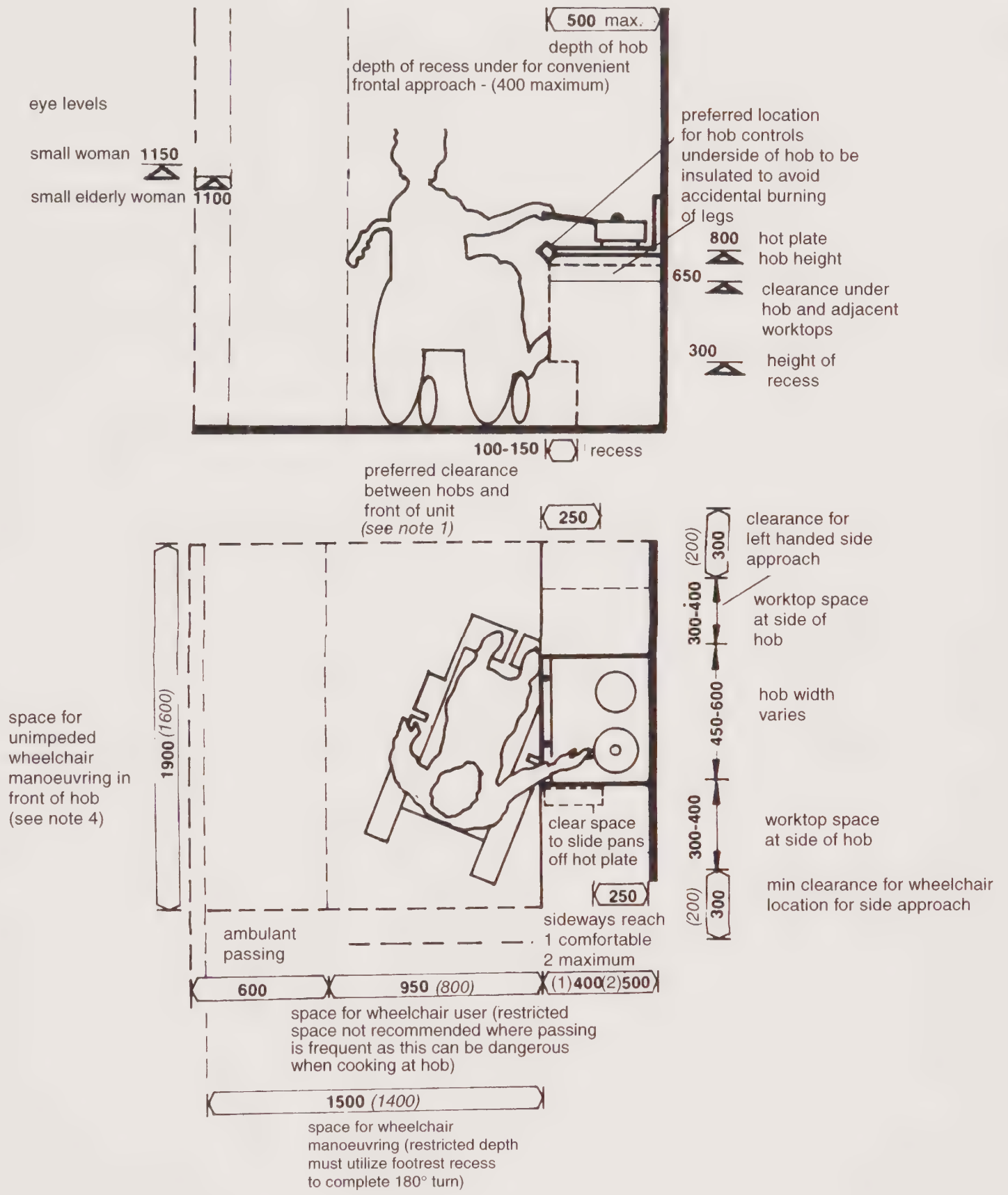
Activities:
Cooking by frying or boiling using hot plates (or rings - see note 3).

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Cooking hob 1

Small

Users:
Wheelchair users


500 max.
depth of hob
depth of recess under for convenient frontal approach - (400 maximum)
eye levels
small woman 1150
small elderly woman 1100
preferred location for hob controls underside of hob to be insulated to avoid accidental burning of legs
800 hot plate hob height
650 clearance under hob and adjacent worktops
300 height of recess
100-150 recess
preferred clearance between hobs and front of unit (see note 1)
250
clearance for left handed side approach
(200) 300
worktop space at side of hob
300-400
hob width varies
450-600
worktop space at side of hob
300-400
(200) 300
min clearance for wheelchair location for side approach
space for unimpeded wheelchair manoeuvring in front of hob (see note 4)
1900 (1600)
clear space to slide pans off hot plate
250
sideways reach
1 comfortable
2 maximum
ambulant passing
600
950 (800)
(1)400(2)500
space for wheelchair user (restricted space not recommended where passing is frequent as this can be dangerous when cooking at hob)
1500 (1400)
space for wheelchair manoeuvring (restricted depth must utilize footrest recess to complete 180° turn)

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Cooking hob must be flush with adjacent work surfaces.

2. Hot plates should preferably be arranged in a straight line to avoid risk of burning caused by reaching across plates / rings, also they should if possible be arranged at the rear of the worksurface to provide space in front for associated preparation activities and to pull pans off plates / rings more easily when liquids are boiling.

3. Flush plates are more satisfactory as they allow pans to be slid across to work surfaces more freely. Spillage is particularly dangerous for persons working from a wheelchair and is more likely when pans can catch on hob supports.

4. *(1600)* dimension is applicable where depth of space for convenient use can be 1500.

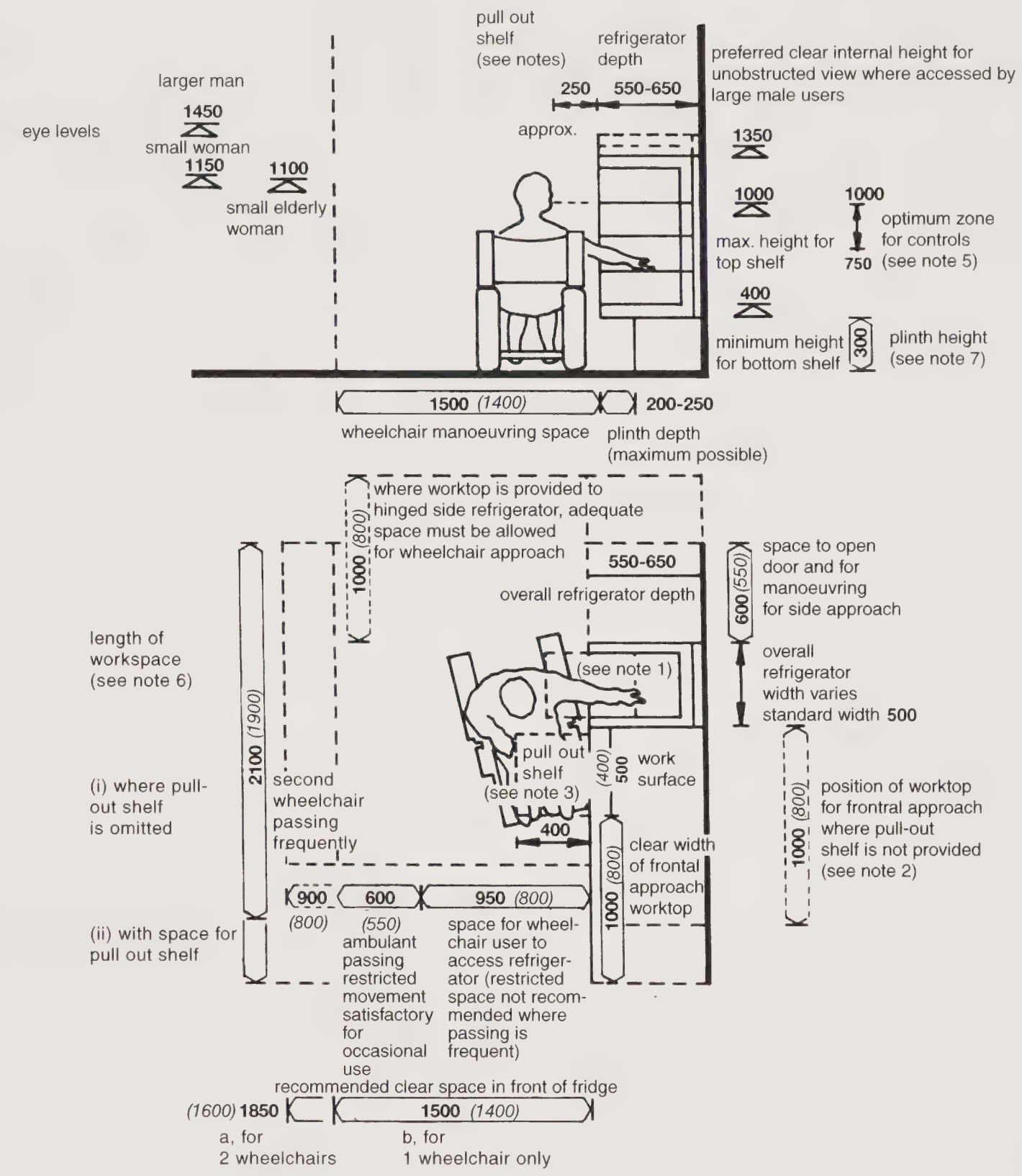
5. Hob controls should be at hob level, preferably immediately in front of the unit. Controls should not be above hob and should not be positioned so as to obstruct safe movement of boiling liquids.

Activities:
Storing and retrieving food.

Refrigerator 1

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Users:
Independent wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. Refrigerator shelves should be pull out, non tip and incorporate a safety stop to avoid accidents.

2. Where no pull out shelf is provided, there must be clear space under the worktop to enable wheelchair users to make a frontal approach directly to the side of the refrigerator. This will enable them to reach the backs of shelves easily when they are pulled out. Worktop adjacent to the pull out shelf should also permit frontal approach to the worktop.

3. An adjacent pull out shelf for the deposit of articles taken from the refrigerator should be provided. Minimum dimensions 400 x 400, minimum height 750.

4. The refrigerator door should open 180°.

5. All controls should be located at the front of the refrigerator for easy access from the wheelchair.

6. Length of workspace depends on exact layout, facilities provided and access requirements, door opening characteristics etc. A workspace length of 1900 is very restrictive and smaller dimensions, although possible, cannot therefore be recommended.

7. The refrigerator should preferably be set up on a plinth to allow the wheelchair footrest to pass under the front. This will allow easier manoeuvring and access.

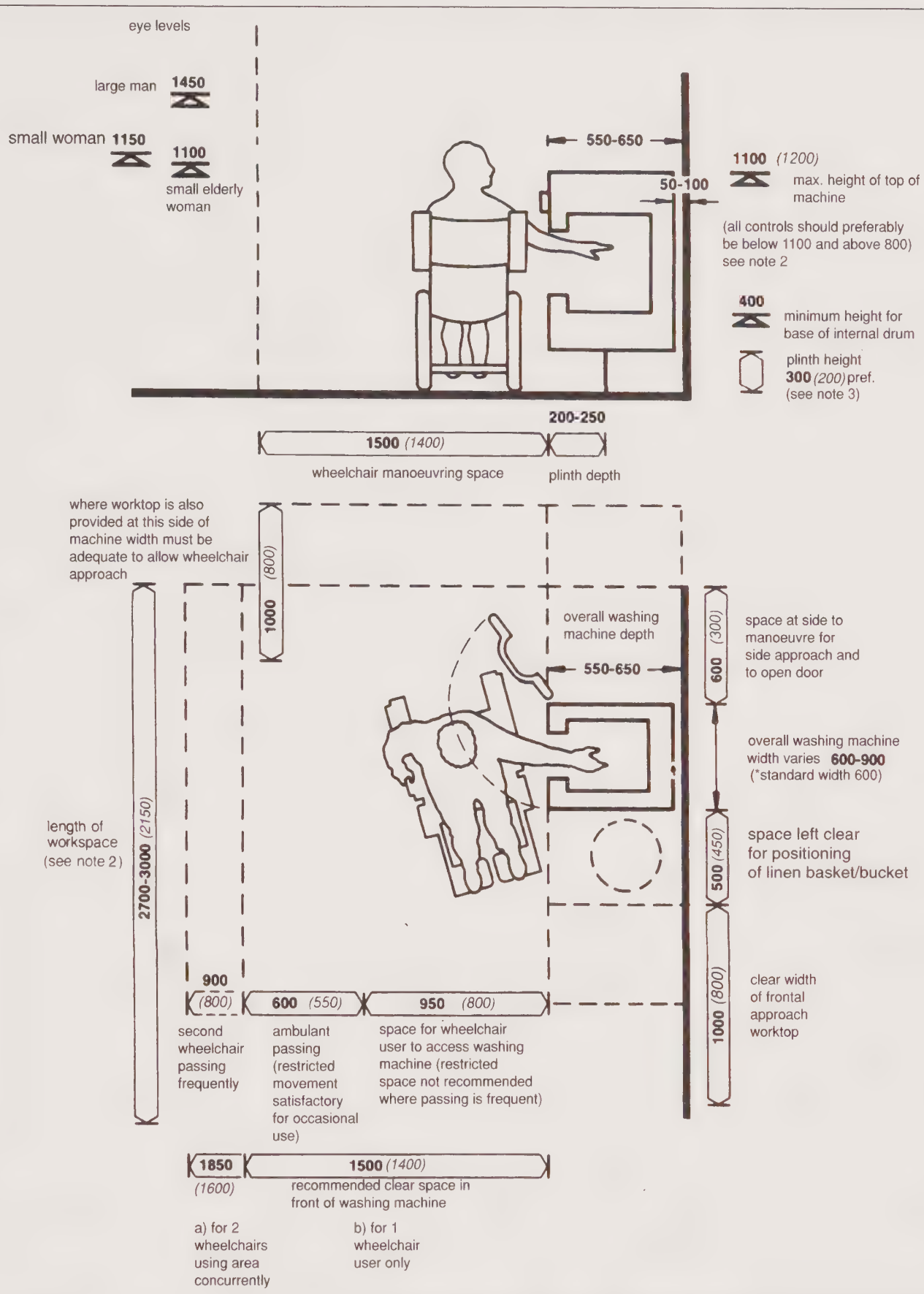
Activities:
Retrieving and placing clothes in washing machine drum. Selecting programmes and operating washing machine controls. Placing powder in powder drawer.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Washing Machine 1

front loading

Users:
Independent wheelchair users


eye levels
large man 1450
small woman 1150
1100
small elderly woman
550-650
50-100
1100 (1200)
max. height of top of machine
(all controls should preferably be below 1100 and above 800) see note 2
400
minimum height for base of internal drum
plinth height 300 (200) pref. (see note 3)
200-250
1500 (1400)
wheelchair manoeuvring space
plinth depth
where worktop is also provided at this side of machine width must be adequate to allow wheelchair approach
1000 (800)
overall washing machine depth
550-650
600 (300)
space at side to manoeuvre for side approach and to open door
overall washing machine width varies 600-900 (*standard width 600)
length of workspace (see note 2)
2700-3000 (2150)
500 (450)
space left clear for positioning of linen basket/bucket
1000 (800)
clear width of frontal approach worktop
900 (800)
second wheelchair passing frequently
600 (550)
ambulant passing (restricted movement satisfactory for occasional use)
950 (800)
space for wheelchair user to access washing machine (restricted space not recommended where passing is frequent)
1850 (1600)
1500 (1400)
recommended clear space in front of washing machine
a) for 2 wheelchairs using area concurrently
b) for 1 wheelchair user only

Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. All controls should be located at the front of the machine, clearly visible and easy to access from the wheelchair.

2. Length of workspace depends on exact layout, facilities provided and access requirements, door opening characteristics etc. A workspace length of 1900 is very restrictive and smaller dimensions, although possible, cannot therefore be recommended.

3. The washing machine should preferably be set up on a plinth to allow the wheelchair footrest to pass under the front. This will allow easier manoeuvring and access.

4. To help users reach the back of the drum, washing tongs should be provided and stored on a hook or peg at worktop level immediately adjacent to the machine.

5. The washing machine door should preferably open 180°.

6. All top loading washing machines are very unsatisfactory for use from a wheelchair and are therefore not recommended.

7. A pull out shelf adjacent to the machine (ht 750) is not helpful as a linen bowl / bucket (ht 280-300) placed in this position would be uncomfortably high.

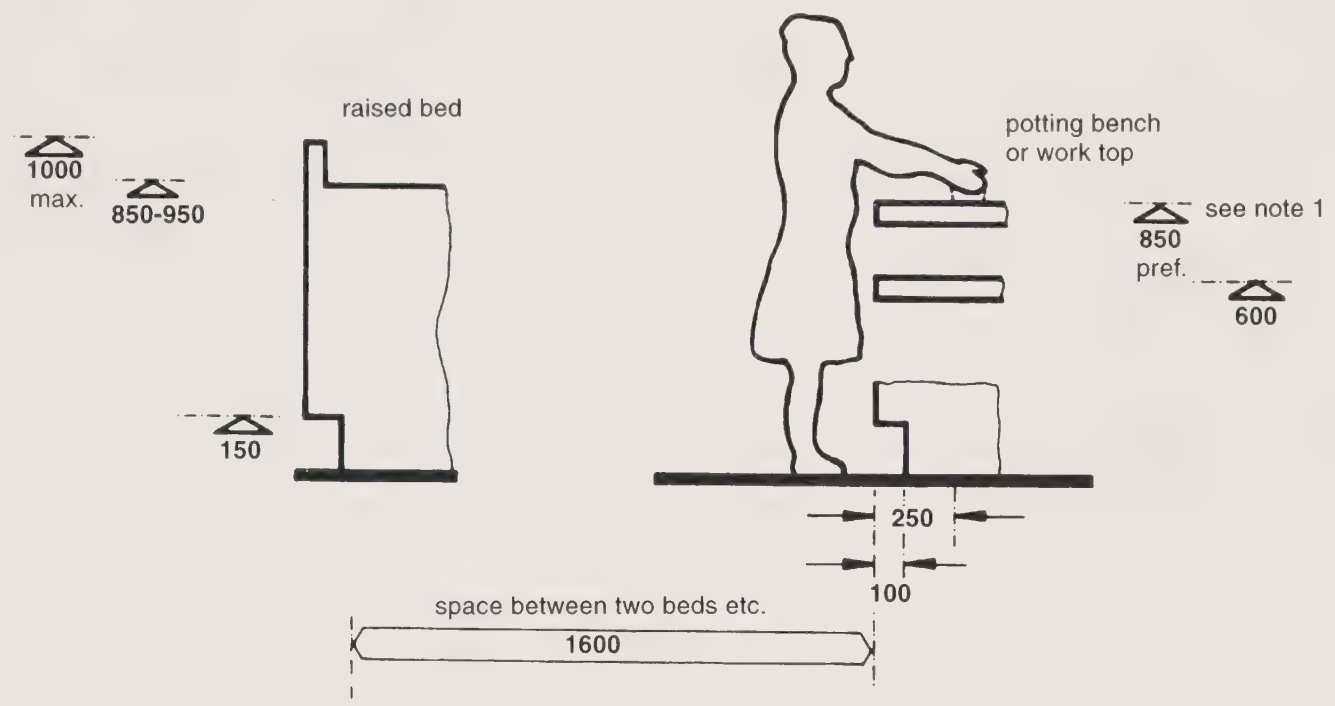
Activities:
Tending plants, rehabilitation. See also Planting beds 2 and 3.

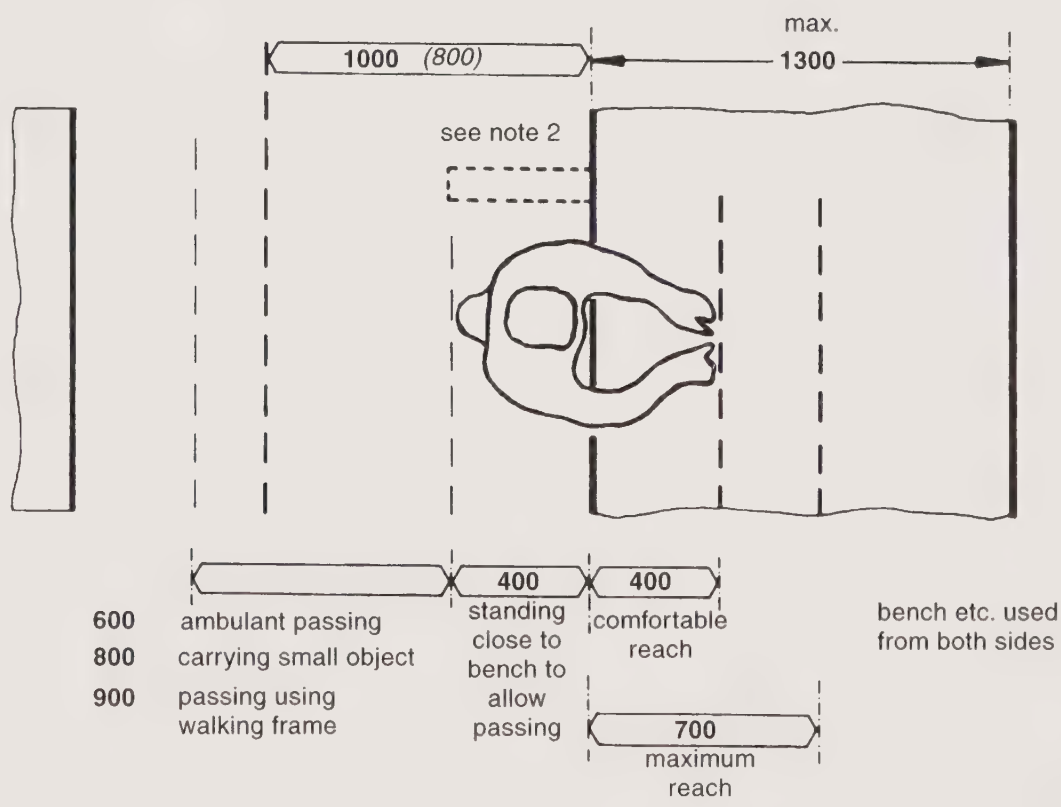
NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Planting beds 1

raised and potting benches

Users:
Semi-ambulant





Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. This applies to a fixed height bench or worktop. A variable height facility is preferred. For standing use range 950, 900, 850, 800. For wheelchair users range 800, 750, 700.

2. A corner position gives lateral support to standing users. Projecting walls of similar height to the work surface will create a similar amenity.

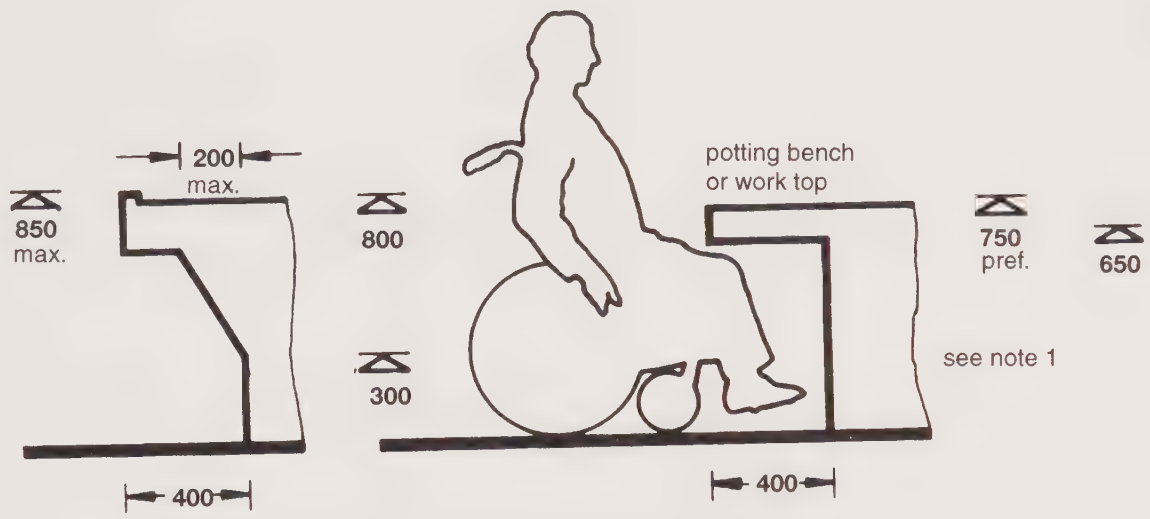
Activities:
Tending plants, rehabilitation. See also Planting beds 1 and 3.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Planting beds 2

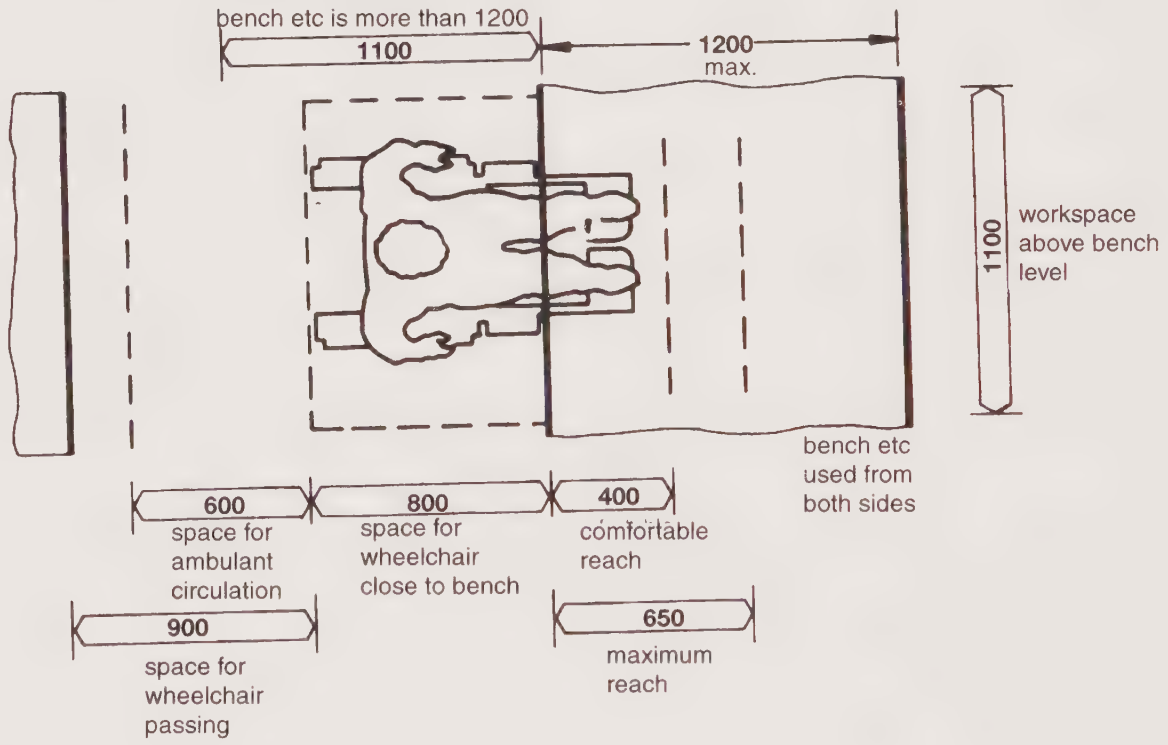
raised and potting benches

Users:
Wheelchair users



1700 normal space between adjacent benches
2500 where traffic is heavy and benches are used intensively

wheelchair manoeuvring space where width of recess is less than 1200
1400
wheelchair manoeuvring space where width of recess under bench etc is more than 1200



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

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1. This applies to a fixed height bench or worktop. A variable height facility is preferred. For standing use range 950, 900, 850, 800. For wheelchair users range 800, 750, 700.

2. A corner position gives lateral support to standing users. Projecting walls of similar height to the work surface will create a similar amenity.

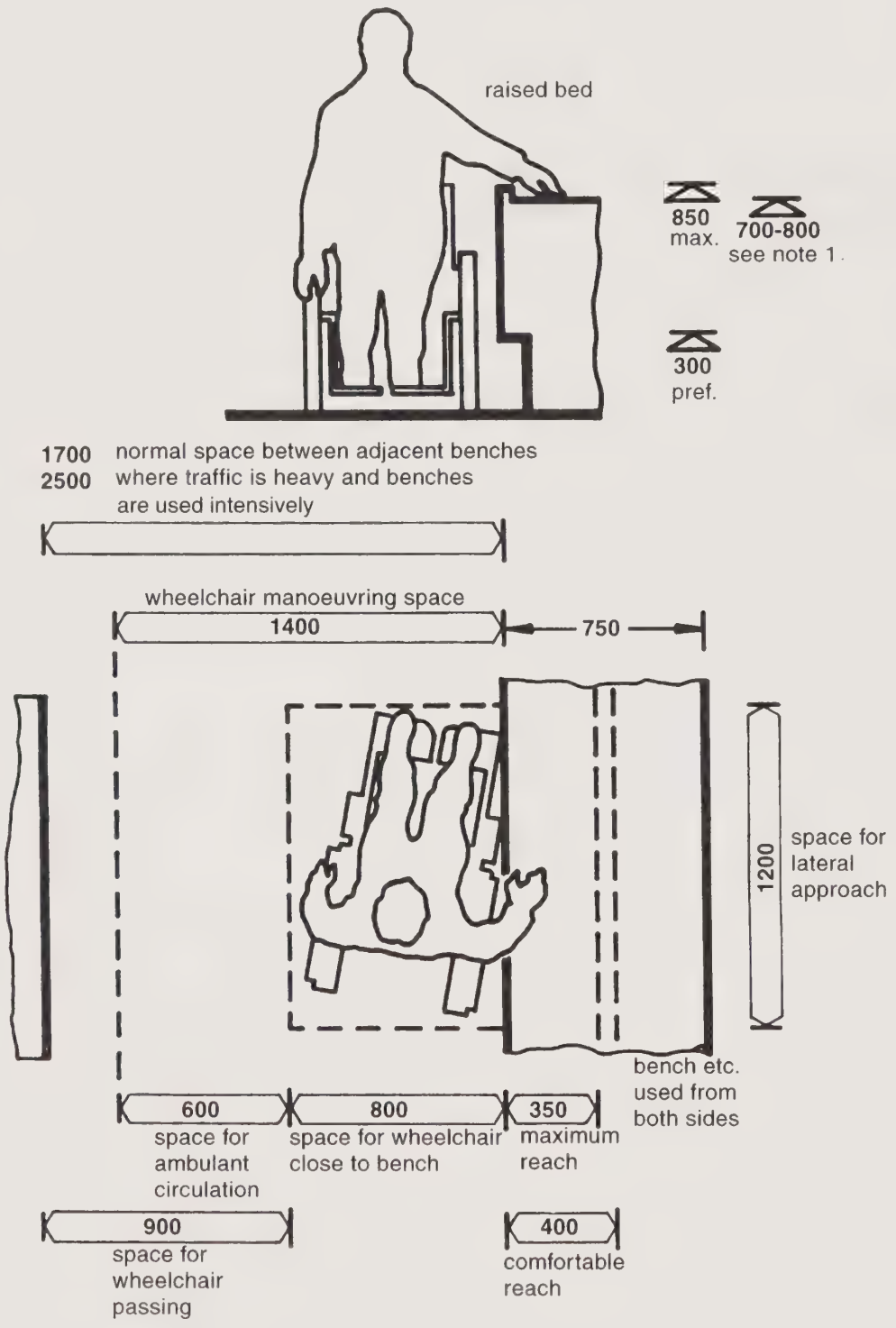
Activities:
Tending plants, rehabilitation. See also Planting beds 1 and 2.

NHSEstates Ergonomic Data Bank
Component-user data sheet, not to scale

Planting beds 3

raised and potting benches

Users:
Wheelchair users



Notes:

1350 *(1300)*

Preferred minimum: *(Restricted minimum, not recommended for general use, see explanatory notes)*

1. This applies to a fixed height bench or worktop. A variable height facility is preferred. For standing use range 950, 900, 850, 800. For wheelchair users range 800, 750, 700.

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Appendix 1

Healthcare premises: checklist of access and facilities for disabled people

Parking

1. Are there parking spaces adjacent to the building(s) to minimise the distances to be travelled?

2. Is the parking space wide enough to allow a car door to open fully to allow unobstructed transfer into a wheelchair, either unassisted or assisted?

3. Is the location of the disabled parking spaces such that the approach route to the building/facility is not obstructed by other parked cars and away from moving traffic?

4. Are kerbs and other changes of level ramped?

5. Is the parking space and access route under cover?

6. Are there adequate signs to identify the reserved parking spaces and the best routes into the premises?

Approach to building

7. Is the approach route smooth, slip resistant (whether wet or dry), free from incidental obstructions or hazards?

8. Are handrails provided on all slopes and resting places provided at intervals where a ramp or approach is long?

9. Are all public entrances to the building/facility accessible?

10. Are access doors wide enough to facilitate wheelchair movement?

11. Are thresholds eliminated or kept to a minimum?

12. Do door characteristics and dimensions of related spaces allow it to be opened (and closed) easily by independent wheelchair users, moving in either direction?

13. What doors can be eliminated?

Internal circulation

14. Are lobby sizes adequate and safe for both independent and assisted wheelchair use?

15. Are corridor and approach routes satisfactory? Do they allow passing and turning and take adequate account of corridor traffic conditions?

16. Have all obstructions and projections from walls (or ceiling) or similar hazards at floor level – such as changes of level – been avoided? If unavoidable are they clearly discernible?

17. Are internal door widths adequate to allow turning through 90° from the corridor or lobby? Should either or both be increased?

18. Have safety handrails been provided on corridors, ramps, steps or at other points where they are required by persons with impaired mobility? Have they been produced where they can be used as location aids by visually impaired people?

19. Are any large areas of glass close to circulation areas marked or framed so as to be clearly discernible to partially sighted people?

20. Are seats available at intervals to permit an ambulant disabled and elderly person to take a short rest when faced with long corridors to negotiate?

Vertical circulation

21. Are staircases safe and optimally comfortable for elderly and disabled people? Are handrail and landing characteristics satisfactory?

22. Are lifts available, conveniently placed, accessible and clearly signed?

23. Are lift controls accessible to the independent wheelchair user? Are the visual and audible signals, alarms and floor designations satisfactory? Are digits embossed and satisfactory for blind or partially sighted persons? Is there a tip-up seat, or a support rail available?

Toilets

24. Are there correctly designed unisex toilets, that is where a husband and wife may enter the cubicle together, available in the public areas of the premises?

25. Are there suitable cubicles for wheelchair users in other male and female toilets in the building?

26. Do cubicles for wheelchair users provide adequate manoeuvring space within, or is turning space provided outside? Is the level of privacy afforded satisfactory?

27. Are there cubicles available with appropriate grabrails for the use of ambulant disabled people?

28. Are the WC and wash-basin arrangements accessible to independent wheelchair users? Are the grab rails, mirrors, towels, door closing bars and other aids placed satisfactorily?

Out-patient and treatment areas

29. Can ambulances discharge patients under cover within close proximity to the entrance? Are waiting areas protected from draughts as patients move in and out through the entrance doors? Can patients using wheelchairs (their own or hospital chairs) whilst waiting for treatment, sit with other patients without obstructing the corridors or circulation area?

30. Can patients in wheelchairs use the reception desk conveniently and privately?

31. Are all consulting and treatment areas fully accessible?

32. Are there changing cubicles suitable for wheelchair users, with room for assistance to be given if required?

33. Are refreshment areas accessible to disabled people?

34. Are clear, well lit, signs posted to ensure easy circulation within the building?

35. Are telephones and other public mechanisms accessible to wheelchair users? Are knobs, dials, switches, handles and other controls operable and within convenient reach?

Ward facilities

36. Do sanitary facilities offer maximum independence and privacy to disabled patients, both those who will be using wheelchairs and those who have walking difficulties?

37. Is the day room accessible, with a variety of seating heights to help ambulant disabled people? Are all notices easy to see and understand?

38. Are window controls, radio and television and call bells easily reached by disabled patients?

39. Can disabled visitors conduct private conversations with their friends in bed or in the ward?

Other features

40. Could disabled employees work in the building – with particular reference to offices, laboratories, canteen, rest-rooms and toilet facilities?

41. Are emergency evacuation routes and emergency exits satisfactory?

42. Are fire alarms readily accessible to the semi-ambulant and wheelchair disabled? Are emergency call facilities installed to summon assistance to remote locations?

43. Are audiovisual alarm signals provided?

Appendix 2 – References

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Appendix 4

Activity Data

1. "Activity data" is an information system developed to help project and design teams by defining the users' needs more precisely. This information constitutes the computerised Activity DataBase, which is updated twice yearly. It comprises three types of information sheet: activity space data sheets (known as A-Sheets), their supporting activity unit data sheets (known as B-Sheets) and A-Sheet component listings (known as D-Sheets).

2. A-Sheets record in more detail than is described in this Note each task or activity that is performed in a particular activity space (which may be a room, space, corridor or bay), together with environmental conditions and the technical data necessary to enable the activities to be performed. Each A-Sheet also contains a list of the titles and code numbers of the relevant B-Sheets.

3. B-Sheets provide narrative text and graphics to scale relating to one activity. They show equipment fitted or supplies as part of the building, also the necessary engineering terminals.

4. D-Sheets provide information about the total quantities of components (excluding those in Group 4 – see paragraph 1.12) extracted from all B-Sheets selected for inclusion in an individual A-Sheet.

5. Activity data is only available in the form of magnetic media, but this may be used to generate paper copies where required.

6. Further information about the use and preparation of activity data can be obtained from NHS Estates, Department of Health, 1 Trevelyan Square, Boar Lane, Leeds LS1 6AE.

Activity data applicable to this Note

7. The A-Sheets recommended for the activity spaces described in this Note are either new sheets, amended ones or selected from existing sheets. A list of A-Sheet code numbers and titles is given at the end of this chapter.

8. Further activity data sheets may be selected, or drawn up by project teams to their own requirements, for any services not described in the Note or included in the list.

9. In order to ensure consistent and economic provision, variations from the A-Sheets recommended for the spaces covered in this Note should be considered only where it has been decided that the function of a space will differ substantially from that described.

Lists of activity data A-Sheets

10. The activity data A-Sheets listed below may not carry a title identical to the activity spaces detailed in this Note. Use of the appropriate A-Sheet code number will, however, result in the correct activity space being accessed.

11. The activity data A-Sheets are listed below in the same order as the spaces to which they relate are listed in the Schedule of Accommodation.

Note The foregoing applies to the MS.DOS application only.

During the currency of this Note an MS.Windows application is being introduced with the following consequences:

A-Sheets are replaced by room data sheets.

B-Sheets are replaced by assemblies.

The term 'D-Sheets' is omitted from component listings.

Activity space	A-sheet code
WC/Rinse basin: fully ambulant users	V1007
WC/Rinse basin: ambulant, semi and assisted ambulant, frontal access	V1101
WC/Rinse basin: ambulant, semi and assisted ambulant, lateral access	V1102
WC/Rinse basin: independent wheelchair users, "Specimen" WC	V0906
WC/Rinse basin: independent and assisted wheelchair users	V0904
WC/Rinse basin: assisted wheelchair users, dual access	V1214
WC/Bidet/Wash basin: independent semi, and assisted ambulant users	V1209
Bathroom/WC/Wash	V1709
Bathroom/WC/Wash: treatment, assisted patient, use of hoist	V1714
Shower ambulant staff users	V0803
Shower/WC/Wash: assisted patient wheelchair users	V1608
Shower/WC/Wash: assisted patient wheelchair users	V1612
Shower/WC/Bidet/Wash	V1620

Appendix 5

Index of Ergonomic Data Sheets in other volumes of HBN 40

Volume 1 – Public areas

Ambulant people
Person 1, walking – circulating and passing
Person 2, walking with assistance
Person 3, with walking sticks or tripods
Person 4, with crutch or crutches
Person 5, with walking frame

Wheelchairs
Wheelchair 1, straight movement
Wheelchair 2, turning 90°
Wheelchair 3, turning 90° and 180°
Wheelchair 4, reach
Wheelchair 5, dimensions and eye levels

Building approach
Car parking 1, easy access
Car parking 2, wheelchair access
Dropped kerb
Ramp
External steps

Doors and lobbies
Door 1, Single-leaf, flush
Door 2, Door handles and vision panels
Door 3, Ironmongery
Lobby 1, Single-leaf doors
Lobby 2, Double-leaf doors
Lobby 3, Automatic sliding doors

Circulation and orientation
Signposting 1, eye levels/focal distances
Signposting 2, viewing distances/height
Signposting 3, viewing distances/width
Internal stairs
Corridors
Handrail
Grabrail

Toilets
Toilet 2, Ambulant, semi- and assisted ambulant – frontal access
Toilet 3, Ambulant, semi- and assisted ambulant – lateral access
Toilet 4, Independent wheelchair users, with basin
Toilet 5, Independent and assisted wheelchair users, with basin
Toilet 6, Dual assisted wheelchair users, with basin
Toilet 7, WC with bidet and basin

Waiting/refreshment areas
Chair 1, Upright
Chair 2, High-seat easy chair
Table 1, Dining, general – ambulant users
Table 2, Dining, general – wheelchair users
Table 3, Dining, square – ambulant users
Table 4, Dining, square – wheelchair users
Table 5, Dining, rectangular – wheelchair users
Table 6, Dining, rectangular – ambulant users
Table 7, Dining, square – ambulant users
Table 8, Dining, round – ambulant users

Components
Basin 1, Handrinse
Basin 2, Medium, personal washing
Basin 3, Handrinse (Wheelchair users)
Basin 4, Medium (Wheelchair users)
Taps 1, Basin
Taps 2, Basin
Taps 3, Basin
Telephone
Mirror 1, Wheelchair users
Mirror 2, Grooming, head and shoulders
Mirror 3, Grooming and dressing, whole body
Windows 1, Standing and seated users
Windows 2, Wheelchair users and patients in bed

Volume 3 – Staff areas

Reception area – General
Staff base – Ward
Pantry
Interview room / Relatives' accommodation
Seminar room

Utility spaces and disposal
Clean utility – In-patient
Dirty utility – General
Disposal room

Cleaning spaces
Cleaning space – General
Cleaning space – Team/heavy duty

Offices
Office 1 – General
Office 2 – Senior staff
Office 3 – All Disciplines
Office 4 – Medical, Doctor's office
Office 5 – Medical, Head of Division
Office 6 – Medical, 2 Senior staff
Office 7 – Interview/Overnight stay

Toilets
Toilet 1, Fully ambulant, with basin
Toilet 2, Ambulant, semi- and assisted ambulant – frontal access
Toilet 3, Ambulant, semi- and assisted ambulant – lateral access
Toilet 4, Independent wheelchair users, with basin
Toilet 5, Independent and assisted wheelchair users, with basin

Showers
Shower 4, Ambulant staff users

Components
X-ray illuminator
Desk 2, single pedestal (1200 x 700)
Chair 1, upright
Chair 4, semi-easy, low-back
Filing cabinet 1, 2-, 3- or 4-drawer
Filing cabinet 2, 3 or 5 rails laterally suspended
Shelving 1, racking, 200–300 deep
Shelving 2, racking, 450–600 deep
Shelving 3, open, 200 deep (wheelchair users)
Worktop Bench 1
Worktop Bench 2
Worktop Bench 3, Independent and assisted wheelchair users
Cupboard 1, Small, wall-mounted
Cupboard 2, Small, wall-mounted
Cupboard 3, Wall-mounted, Wheelchair users
Cupboard 4, Low-level
Drawers 1, Independent wheelchair users
Screen/Board 1
Screen/Board 2
Person 8, Dressing/undressing
Seat and clothes hooks; changing
Locker 1, small luggage
Locker 2, Staff
Switches and Sockets, wall-mounted
Suction Cleaner, Cylinder-type
Scrubber/Polisher
Bucket Trolley, Double, with wringer
Basin 5, Medium; clinical washing (staff users)
Sack Holder, Large, mobile
Sink 4, Stainless steel, single with draining-board

Volume 4 – Circulation areas

Ambulant people
Person 1, walking – circulating and passing
Person 2, walking, with assistance
Person 3, with walking sticks or tripods, and assistance
Person 4, with crutch or crutches, and assistance
Person 5, with walking frame

Wheelchairs
Wheelchair 1, straight movement
Wheelchair 2, around corner
Wheelchair 3, turning
Wheelchair 6, parking end to end
Wheelchair 7, parking side by side
Corridor – ambulant and wheelchair users: circulating and parking

Patient trolleys
Patient trolley 1, straight movement
Patient trolley 2, around corner
Patient trolley 3, through 1500 doorset
Patient trolley 4, through 190°0 doorset

Beds
Bed 1, adjustable or fixed-height bed sizes
Bed 2, straight movement, with or without attendants
Bed 3, through 1500 doorset
Bed 4, through 1900 doorset
Bed 5, turning 90° corner
Bed 6, turning through 180° corner

Lobbies
Lobby 1, Single-leaf doors
Lobby 2, Double-leaf doors
Lobby 3, Automatic sliding doors

Lifts and Stairs
Lift and Controls – passenger, 1600 x 1400
Lift – multi-purpose stretcher/trolley, 1400 x 2400
Lift – bed, 1800 x 2700
Internal stairs
Staircase, mattress evacuation 1: straight flight – corridors
Staircase, mattress evacuation 2: landings and stairs

Trolleys/mobile equipment (large)
Trolley/mobile equipment 1 – types
Trolley/mobile equipment 2 – types
Trolley/mobile equipment 3, straight movement
Trolley/mobile equipment 4, around corner
Trolley/mobile equipment 5, through doors (1000 or 1200)
Trolley/mobile equipment 6, though doors (1400 or 1800)
Trolley/mobile equipment 7, turning
Trolley/mobile equipment 8, parking at 90° to wall
Trolley/mobile equipment 9, parking parallel to wall
Platform truck 1, straight movement
Platform truck 2, around corner and through doorway
Platform truck 3, turning
Pallet truck 1, straight movement
Pallet truck 2, around corner and through doorway
Pallet truck 3, turning
Pallet truck 4, parking
Sack truck 1, tilting, and straight movement
Sack truck 2, around corner
Sack truck 3, through doorway
Sack truck 4, turning

Tugs and trains
Tug 1, basic dimensions; straight movement
Tug 2, turning
Tug 3, charging bay

Tug and train 1, straight movement
Tug and train 2, around corner, chamfer A
Tug and train 3, around corner, chamfer B
Tug and train 4, turning into an opening
Tug and train 5, turning
Tug and train 6, ramps
Tug and train 7, lay-by

Service ducts
Service duct 1, Horizontal crawlway – access hatch
Service duct 2, Horizontal crawlway – through route
Service duct 3, Vertical shaft with ladder
Service duct 4, Step ladder
Service duct 5, Horizontal (floor/ceiling) hatch
Service duct 6, Catwalk
Service duct 7, Horizontal walkway with or without services
Service duct 8, Horizontal crawlway with services

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